UTILISATION OF TRASH FISH

*II. STUDIES ON PREPARATION OF FISH SOUP MIX

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The paper deals with the investigations carried out on the preparation of fish soup mix using partially deodourised trash fish meat. The product contained about 25% protein and had a storage life of 4 months at ambient temperature (28–31°C).

INTRODUCTION

Preparation of diversified and ready-to-serve products is suggested as the best method of utilisation of trash fishes which constitute about 30% of our total landings. The possibility of converting edible portions of such fishes into fish flakes, a readily marketable product, has already been communicated. (Venugopalan and Govindan, 1967.) The present work deals with studies on the preparation of yet another product, viz., fish soup mix. Besides working out a method which can be easily adopted for commercial production, studies were also made on the various aspects of storage changes of the product.

MATERIALS AND METHODS

Mixed trash fishes comprising of mostly kilimin (*Synagris* spp.), jew fishes (*Otolithes* spp.) and silver bellies (*Leiognathus* spp.) were dressed and cooked in twice the weight of water for 30 minutes. The meat was seperated and then deodourised as reported in part I of this series. The partially deodourised fish meat was used for the preparation of soup mix as follows.

The meat was blended with equal amount of water. The ingredients (Table I) were fried to brownish tint and added to the homogenised (with equal amount of water) fish meat and salt. They were mixed well, boiled for 5 minutes, poured in aluminium trays in thin layers (1–2 cm thickness) and dried at 70°C in a tunnel dryer for 5–6 hours. The dried material was powdered in a waring blender, followed by the addition of nutritive agents, sweetener, emulsifier and preservatives. (Table I) It was then mixed well and packed in polythene lined aluminium bags.

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TABLE I RECIPE FOR FISH SOUP MIX

Fish	107.2 parts (Moisture: 67.33%)	
Salt	9.0 ,,	
Fat	8.0 ,,	to be fried
Onion	70.0 ,,	to be fried
Coriander	1.0 ,,	to be fried
Starch (maida)	20.0 ,,	
Glucose	4.0 ,,	
Skim milk powder	8.0 ,,	
Sodium Ascorbate	0.5 ,,	
Carboxy methyl cellulose (CMC)	0.2 ,,	
Mono sodium glutamate (MSG)	0.2 ,,	
Pepper	1.0 ,,	
Beet root	30.0 ,,	

TABLE II CHEMICAL COMPOSITION OF FISH SOUP MIX (ON ORIGINAL WEIGHT BASIS)

Moisture	8.43%
Ash	4.3 %
Protein (T N x 6.25)	23.44%
Water Soluble Nitrogen	640.00 mg. %
Fat	11.49%
Salt	10.15%
Calcium	285 00 mg. %
Phosphorus as P_2O_5	790.00 mg. %
Vitamin A	500 I. U.
Vitamin B_2	0.029 mg. %
Vitamin B_{12}	0.261 mμg %
Niacin	0.453 mg. %
Folic Acid	0.012 μg %
Pantothenic Acid	0.248 mg. %
Calorific Value	490 Cal/100g.

TABLE III AMINO ACID COMPOSITION OF FISH SOUP MIX (ON ORIGINAL WEIGHT BASIS)

Arginine	246 mg. %
Methionine	229 ,,
Lysine	168 ,,
Threonine	89 ,,
Tryptophan	30 ,,
Valine	165 ,,
Histidine	134 ,,
Leucine	347 ,,
Isoleucine	197 ,,
Cystine	62 ,,

RESULTS AND DISCUSSION

The product had a light yellow colour and a moderate odour of spices, which became prominent on boiling with water. The boiled suspension took about 10 to 15 minutes to settle completely. The final product was analysed for protein, fat, minerals and vitamin A according to A. O. A. C. (1960) methods. The amino acids and B vitamins were estimated by microbiological methods. Calorific value was estimated by chromic acid oxidation method (Sarma *et al.*, 1960). The values are given in tables II and III.

Storage studies of the product were carried out by keeping the samples in polythene lined aluminium bags at an elevated temperature of 37°C. The changes brought about in the product due to browning, oxidation and changes in the microbiological quality of the product were followed at intervals

CHANGES BY BROWNING REACTION

The changes occuring in the product due to non-enzymic browning reaction between amino acids, proteins and carbohydrates were followed by noting the colour of 80% alcohol extract at 438mμ. The optical density of the extract reached maximum value in 30 days at 37°C (Fig.1). The changes in reducing sugars and free α-amino nitrogen were followed in the soup mix during storage at 37°C. The reducing sugars were estimated by the copper reduction method (A. O. A. C., *loc cit*). The total reducing sugars decreased by 48% after storage for 6 weeks at 37°C (Fig. II). The total free α-amino nitrogen was determined after different periods of storage by the method of Pope and Stevens (1939). The values decre-

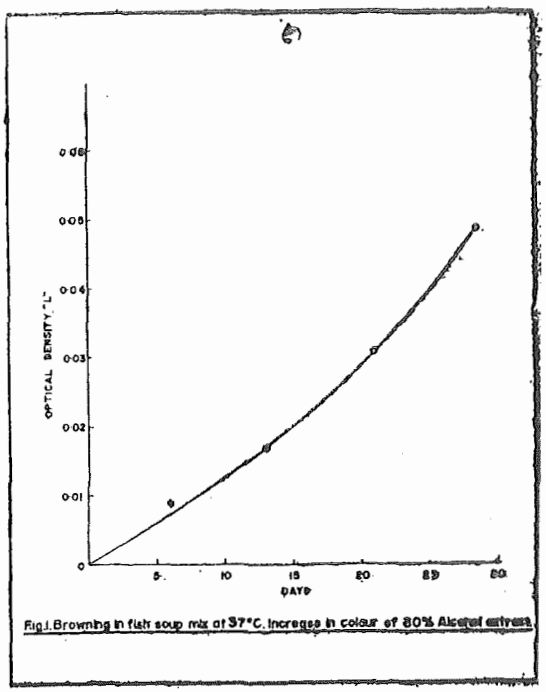

Fig.1 Browning in fish soup mix at 37°C. Increase in colour of 80% Alcohol extract

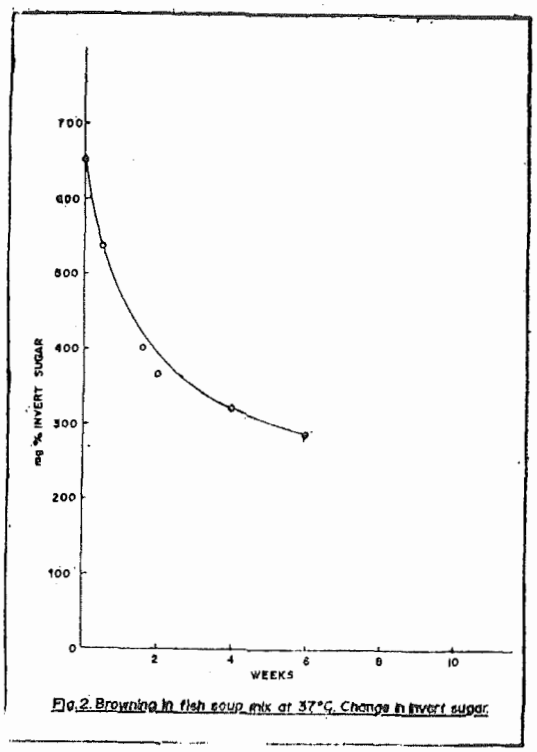

Fig.2 Browning in fish soup mix at 37°C. Change in invert sugar.

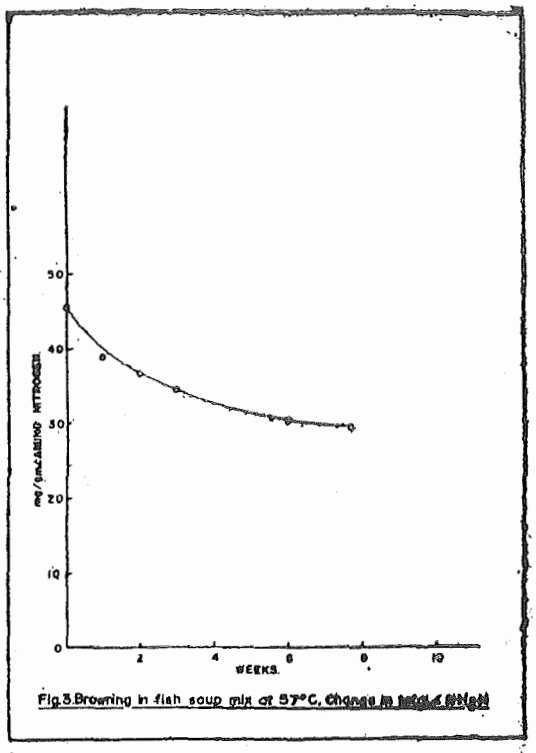

Fig.3 Browning in fish soup mix at 37°C. Change in total & NH2N

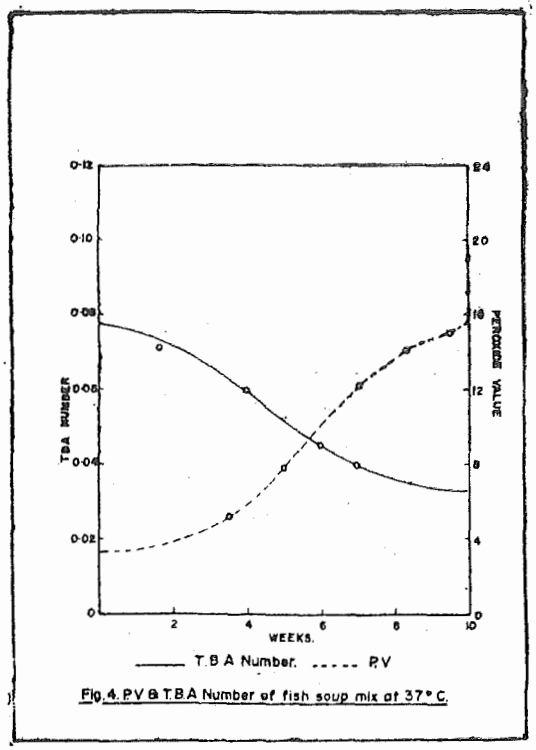

Fig.4. P.V & T.B.A Number of fish soup mix at 37°C.

ased by about 30% within 8 weeks of storage (Fig. III). The decrease in total reducing sugars and free ∝-amino nitrogen were more during the first 4 weeks of storage

OXIDATIVE CHANGES

The oxidative changes that underwent in the product stored at 37°C in polythene lined aluminium bags were measured by estimating the peroxide value and thiobarbituric acid number (TBA number) (Tarladgis *et al* 1960). The PV and TBA numbers are given in fig IV.

The peroxide value of the product increased and the TBA number decreased during storage, which agreed with the observation reported by Sinnhuber and Yu (1958).

MICROBIOLOGICAL CHANGES

The fresh product was tested for micro-organisms like *salmonella, streptococci* and *coliform,* all of which were found to be absent. It was found that on storage at 37°C, the total count decreased from an initial value of 6.1×10^4 /g to 3.0×10^4 /g, 9.2×10^3 /g, 1.4×10^4 /g and 7.5×10^3 /g after 2, 4, 6 and 8 weeks, of storage respectively. The total count after storage for 4 weeks at room temperature also dropped to 9.3×10^3 /g. The initial count of the product was within limits according to Famelli *et al,* (1965), who reported that the total counts of most of the samples surveyed by them from retail markets were less than 10^6 /g and were of remarkably good quality from microbiological point of view.

EQUILIBRIUM RELATIVE HUMIDITY STUDIES AND OPTIMUM MOISTURE CONTENT

With a view to studying the storage characteristics of the product, equilibrium relative humidity studies were conducted as described by Iyengar *et al* (1965) and Strolle *et al* (1968). Samples were placed under different relative humidities until constant weights were attained. The equilibrium moisture contents of the samples were plotted against the corresponding relative humidities (Fig. V). The curve shows that equilibrium moisture contents do not vary much upto an R. H. of 65%. Afterwards it steadily increases with the R. H. This indicates that the packaging material should be impermeable to moisture at room temperature at which the R. H. normally remains above 70% at our climate.

Salwin (1959) reported that the moisture content at which certain dehydrated

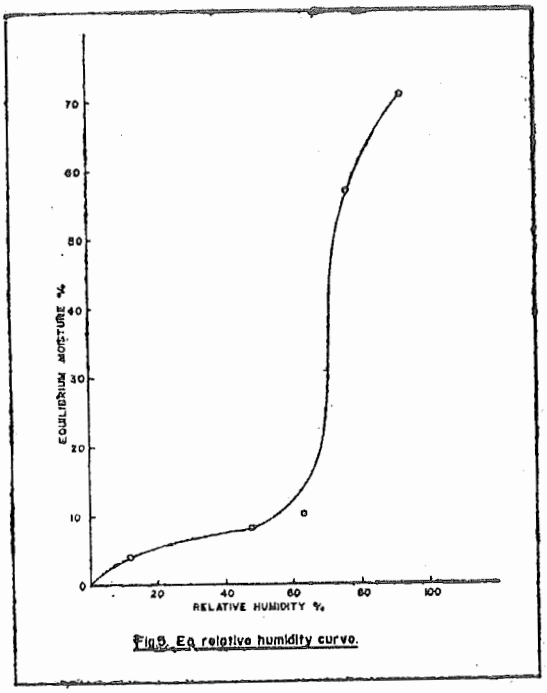

Fig.5. Eq relative humidity curve.

foodstuffs have got maximum storage life agrees closely with the moisture content representing a monolayer of adsorbed water. This was calculated in the case of fish soup mix from moisture sorption data by means of Brunauer, Emmett and Teller (B. E. T.) theory of multimolecular adsorption. (Strolle and Cording Jr., 1965). The optimum moisture content on dry weight basis was found to be 9.72% for the product. However such a moisture content also was high as far as the storage life of the product was concerned. Charie *et al* (1962) reported that optimum (critical) moisture content for onion soup mix was 5.5% which gave a maximum shelf life of 8 months at 29°C, In the case of fish soup mix with a moisture content of 6.1% the maximum shelf life was found to be 4 months at this temperature, as judged by organoleptic rating.

SUMMARY AND CONCLUSION

Cooked and deodourised trash fish meat can be successfully used for the preparation of fish soup mix containing about 25% protein by incorporation of salt, spices, thickener, emulsifier and flavouring

agents. It could be prepared for the table by boiling a 5% suspension of the powder for 1–2 minutes. The product has a shelf-life of 4 months at ambient temperatures (28–31°C). Incorporation of 30 parts of precooked beet root was found to impart a pale rose colour to the product.

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