

**THE MODE OF FORMATION
OF
MYANMAR SHRIMP PASTE**

Ph.D. DISSERTATION

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Title : The Mode of Formation of Myanmar Shrimp Paste

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Abstract : Myanmar shrimp paste from small shrimp (*Acetes spp.* and Mysids) was processed and fermented in the laboratory in order to study the mode of formation of shrimp paste during the fermentation time. Processing was carried out by using small shrimp, washing with distilled water, salting with 20% NaCl (Analar) and solar salt, respectively, sun drying (temperature not exceeding 40° C), and kneading to a paste form. Fermentation was carried out at the ambient temperature of about 30° C and changes in physicochemical properties such as pH, salt, water, and their ratio, protein, lipid, total volatile nitrogen together with ammonia and trimethylamine nitrogen, and the presence of certain heavy metals were determined. Changes in amino acids pattern were also determined. Volatile organic compounds present in the finished product of shrimp paste were also analysed. Microbiological changes during the processing and fermentation time frame were assayed. The presence of total volatile nitrogen is reflective of a quality grade matured shrimp paste. It was found to increase in the early fermentation stages with the presence of high counts of Gram-negative *Pseudomonas spp.*, but became stabilized in the later maturing stages with a corresponding increase in amino acids content which governs the nutritive values of the paste. It was

found that the prevailing conditions of the matured shrimp paste was sustained by the abundance of predominantly significant Gram-positive bacteria, *Bacillus* which may have also affected the nature and quality of the shrimp paste. The presence of polyunsaturated fatty acids indicated that lipid degradation did occur to some extent. Volatile organic compounds were also found in matured Myanmar shrimp pastes, particularly with a relative abundance of 2-ethyl-5-methylpyrazine which may have contributed to the characteristic aroma and the slightly basic nature, *i.e.*, pH ~ 8.0, unlike the fish and shrimp pastes of other countries. Heavy metals, toxic and non-toxic, such as cadmium, lead, copper, iron, zinc together with calcium were found in the shrimp paste but the toxic elements were within the allowed limits. Bacteriological assay showed that the food poisoning bacteria were in their lowest probability limits, *i.e.*, acceptable for human consumption. From these findings, physicochemical properties and some specific types of bacteria played an important role in the mode of formation and production of quality grade Myanmar shrimp paste.