

**THE MODE OF FORMATION
OF
MYANMAR FERMENTED TEA**

Ph.D. DISSERTATION

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Title : The Mode of Formation of Myanmar Fermented Tea

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Abstract : Fermented tea is a popular gourmet dessert processed in Myanmar only and is known as “Lepphet” in Myanmar, which is consumed by a range of age groups at all levels of society. For this investigation, the samples of fermented tea from common tea plant (*Camellia sinensis*) for study were naturally processed by solid-state fermentation in a pit (under ground) and hollow cylindrical bamboo matting (above ground) without adding any preservatives followed by a subsequent 12-month storage allowing for final maturation into the fermented tea. The studies on the changing patterns of and/or interplay between the microbial world, and chemical and biochemical species around those microbes focused on a solid-state fermentation in order to explain how our favourite “Lepphet” takes its characteristic shape and texture with pleasant flavour and aroma. Fermentation was carried out at the ambient temperature of *ca.* 30°C and changes in physicochemical entities such as pH, water, fat, total nitrogen, protein, tannin, ash and the presence of certain trace elements were determined. Thin layer chromatography and spectroscopic methods such as UV, FT-IR, ¹H and ¹³C NMR, GC-MS were also applied to collect information on the qualitative nature of alkaloid caffeine present in the fermented tea. A quantitative determination of isolated caffeine was done by HPLC with UV detection. Microbiological growth pattern changes occurring during the processing and fermentation time frame were also monitored. It was

found that the prevailing conditions of the maturation period of tea leaves were characterized by a bioburden of typical fungi imperfecti such as *Geotrichum*, *Aspergillus*, and *Penicillium*, which may have interacted with physicochemical entities and other biological species in a natural physical containment system. The presence of polysaturated and polyunsaturated fatty acids indicated that enzymatic degradation did occur from their precursors to some extent. During fermentation, the conversion of tannin to gallic acid brought about by the action of fungi must be responsible for the fermented tea to acquire the less bitter taste. The fact that some organic acids were also found in matured fermented tea may have contributed to the characteristic aroma and flavour, and the slightly acidic taste with a pH around 5.0. Microbiological control tests revealed that the food-poisoning bacteria were also in their allowed limits for human consumption. On the other hand, carcinogenic aflatoxins and ochratoxin producing moulds were not found in the fermented tea samples. Most of the bacteria found during the fermentation time are those of normal flora inhabiting on tea leaf and therefore it may be deduced that physicochemical entities and specific types of yeast and moulds interplay in the process of mode of formation and manufacture of Myanmar fermented tea.