

ELIMINATION OF FOUL ODOUR IN PARBOILED

RICE

BY

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Dissertation submitted to the University of Kelaniya,

Kelaniya, Sri Lanka,

in partial fulfillment of the requirement of the

Master of Science degree in Microbiology

1997

ABSTRACT

The parboiling process is a pretreatment process given to paddy in several countries to prevent the breakage of rice during milling. It includes soaking, steaming and drying process. Present study was carried out to investigate the changes in physical and microbiological properties and measures to control bad odours in parboiled rice.

During this study, the samples were removed from five traditional single-boiling parboiling plants. Four samples were removed from each parboiling plant at different time intervals. First sample was drawn at the beginning of the soaking process, second, third and final samples were drawn after 24hr, 48hr and 72hr of soaking respectively. Each sample was drawn according to the statistical sampling procedure. The variation of physical properties like temperature, pH and odour of paddy soaked water was recorded. Pour plate technique was used to determine the total bacterial count; different types of colonies were isolated, characterized and identified. Each isolate was inoculated separately in to sterile, soaked paddy sample and odour development was checked. Changing soaked water frequently and salt treatment was carried out to control bad odours in parboiled rice. To determine the effect of changing water and effective salt concentration, total viable counts pH and odour of the soaked water was examined. Three different methods of salt treatment as applicable to different parboiling processes were carried out and to determine the best method treated paddy were tested for microbial counts and organoleptic qualities. To determine an additional benefit of salt treatment on drying time, treated paddy was examined for moisture content.

From the results, the water temperatures did not show considerable variation during soaking whereas pH showed a decrease. All the tested samples had acidic pH levels. Bad odour of the soaking water intensified with time. The total bacterial count increased

within 24hr and remained constant during the soaking period. Microbiological studies revealed Gram negative *Alcaligenes sp.*, *Enterobacter sp.*, *Escherichia sp.*, *Proteus sp.*, *Serratia sp.*, *Aeromonas sp.*, *Pseudomonas sp.*, *Klebsiella sp.* and Gram positive *Bacillus sp.* *Staphylococcus sp.* and *Micrococcus sp.* were present in soaking water. Predominant types varied with time. During first 24hrs predominant bacteria were Gram positive *Bacillus* and cocci but after that Gram negative *Enterobacter* and *Klebsiella* were the predominant types. Odour development is attributed to Coliform group of bacteria, which were predominant in the latter phase of the soaking process. There was no noticeable variation in total bacterial counts due to changing soaked water frequently. Bad odour of the soaked water decreased by a noticeable level by the above-mentioned method. This may be attributed to the pH variation in samples with changing water. Unlike controls, there were no gradual decrease in pH but initial decrease and then remained constantly. This may be attributed to cease of stepwise breakdown of nutrient matter due to change of soaked water. Therefore there's no chance for a succession of microorganisms. So that odour-producing bacteria may not have developed.

Result of salt treatment revealed that 14% salt concentration is the optimum effective level for treatment of paddy during processing. For further confirmation microbial flora of soaked water at 14% salt level was determined and found that the odour producing bacteria (the Coliform group) had been inhibited due to salt treatment. Out of three treatments, salt treatment after soaking paddy was the best treatment in elimination of bad odours of rice while keeping other expected quality characteristics. Moisture content results revealed that drying was fast in salt treated paddy. Quick drying is due to the action of salt on paddy husk, which prevent the entry of water and encourage de-watering. As excess water is not absorbed, paddy kernel does not open to the environment. Fast drying and unopening of the kernel prevent contamination and

produce odour free parboiled rice cost reduction is another advantage of fast drying.