## ABSTRACT

In order to produce enriched instant rice using soak-steam-dry method, various special laboratory scale equipment suitable for specific requirements of different unit operations were developed. Soaking behaviour of raw milled rice in water was studied and a mathematical model was developed to express hydration characteristics. Steaming characteristics of soaked raw milled rice and hydration characteristics of steam cooked rice were studied.

Optimum cooking time of instant rice samples produced from raw milled rice using single stage steaming-cum-tray drying technique and double stage steaming-cum-tray drying technique was found to be in the range of 12-15 min and 9-12 min respectively. The brokens and lumps obtained in the final products from these techniques were as high as 36-56%. Double stage steaming-cum-fluidized bed drying technique adopted to produce instant rice, brought down the cooking time of instant rice upto 6 minutes apart from reducing the brokens and lumps in the final product.

Surfactant treatment of cooked rice eliminated its clumping tendency during dehydration step. It also helped to reduce the optimum cooking time of instant rice by about 50%. Hydrothermal treatment to paddy improved the quality of instant rice produced from it by eliminating 'checking' of instant rice kernels. Instant rice produced from hydrothermally treated paddy, by adopting double stage steaming-cum-fluidized bed drying technique and

surfactant treatment was found to cook in about 2 min. A degree of starch gelatinization during paddy parboiling treatment characterized by peak viscosity 200 BU and cooked paste viscosity 315 BU, was found to be optimum for production of instant rice.

Instant rice could be made successfully from different rice varieties grouped under three classes of rice, namely, common, fine and superfine based on physical dimensions. The average processing loss of dry solids was 6.17% for various rice varieties tested. Compared to raw brown rice, the loss of thiamine, riboflavin and niacin in the case of instant rice produced from parboiled rice were 71.43%, 57.14% and 63.99% respectively which were compensated by artificial enrichment. Sensory evaluation showed, the overall quality of developed instant rice did not significantly differ at 5% level from the imported leading commercial brand of instant rice. The instant rice kernel had an open structure and looked like an ellipsoidal shell. Microstructural studies on the instant rice kernels were made. Numerous longitudinal micro-cracks on the surface of the instant rice kernel were observed. The internal structure of instant rice obtained from raw milled rice showed many ring-like starch formations which appeared as 'checks' when viewed with naked eyes. However, instant rice obtained from parboiled rice did not show any such 'checking'.

**Key Words:**
Instant rice, Enrichment, Parboiling, Surfactant treatment, Hydration characteristics, Rice varietal characteristics, Microstructure.