A STUDY ON RICE BRAN STABILIZATION AND DEVELOPMENT OF A PILOT PLANT RICE BRAN STABILIZER

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by

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ABSTRACT

It is a commonly known fact that the amount of moisture has a direct influence on the rate of formation of free fatty acids in Rice bran. During storage of rice bran, the free fatty acids in bran increase with the increase of storage temperature in the presence of moisture. This chemical reaction has been found to be due to the reaction of bran oil with moisture in the presence of enzymes as catalysts. In addition to many methods used to arrest the formation of free fatty acids in rice bran, heat treatment is one of the popular methods. Here bran is subjected to heat treatment prior to storage. Eventhough empirical conditions have been evaluated for the treatment, no satisfactory mathematical model exists in order to estimate the formation of free fatty acids in rice bran. This study presents a mathematical model for the prediction of the formation of free fatty acids in rice bran during drying in the temperature range of 40° C-130° C. The analysis of the mathematical model agreed with the general behaviour of enzyme with temperatures. The theoretical results are compared with the experimental observations and It was found that the model can be used satisfactorily for the prediction of formation of free fatty acids in rice bran with the time and temperature in the temperature range 40°C-130°C. This study has also applied the above derived model for storage conditions in order to predict the storage ability of treated rice bran at storage temperaures 30°C and 35°C. Experimental results already available were found to be in agreement with the predicted theoretical values based on the model. The model was also used to evaluate the effect of batch heat treatment and fluidized bed treatment on rice bran stabilization. It was concluded that the treatment of rice bran under fluidizing condition at 110 C for a period of 5 minutes was necessary for stabilization of rice bran. Theory based on the above model was applied in designing a pilot plant for stabilization of rice bran under fluidizing heat treatment condition. The pilot plant was later fabricated, erected and tested. Tests carried out on the plant proved that rice bran can be effectively stabilized by using the pilot plant.