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メタデータ	言語: English 出版者: 公開日: 2019-12-20 キーワード (Ja): キーワード (En): 作成者: HEBBAR, Umesh メールアドレス: 所属:
URL	https://doi.org/10.24514/00002861

国連大学生研究成果

Application of Novel Thermal Processing Technique to Produce High Quality Foods

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ABSTRACT

Aqua-gas is mixture of micro-droplets of hot water in superheated steam and these droplets are expected to increase the heating efficiency of the heating medium. The proposed work employs aqua-gas (AQG) and superheated steam (SHS) for thermal treatment/ blanching/pasteurization/ of foods. Thermal treatment of brown rice variety (koshihikari, japonica) for parboiling was attempted. Parboiling is a hydro-thermal treatment aimed at inducing milling, nutritional and organoleptic improvements in rice. Comparative study of AQG processing with SHS and normal steam treatment was carried out and product qualities in terms of color, hardness, grain dimension, degree of parboiling, head yield, viscosity, starch damage and cooking characteristics of parboiled rice were analyzed. The work focused also on the feasibility of employing oven drying of japonica rice in place of conventional shade drying. Soaking for 2 h in water at 95°C, steaming for 12-16 min with normal steam and drying at 38°C for 4-5 h resulted in desirable product quality in parboiled rice. The quality of oven and shade dried parboiled rice differed appreciably. Parboiling resulted in browning of grains and the head yield was very high (>95%) for most of the parboiling conditions. SHS and AQG processing resulted in harder grains (up to 22%) as compared to normal steam processing. Cooking time (electric rice cooker) was less in parboiled rice as compared to white rice. Study indicated that the physicochemical properties of parboiled rice obtained using AQG and SHS differed significantly from conventionally parboiled rice.

One of the most important characteristics of fresh fruits and vegetables is their high enzymatic activity. The pre-proc essing operation, which is mainly carried out to inhibit the enzymatic activity is termed as blanching. Conventional blanching techniques that are industrially employed are hot water and steam blanching. In the present study, application of AQG and SHS blanching of red pepper (*Capsicum annuum* L) was explored and comparison of the product quality with that of conventional techniques was done. Inactivation of peoxidase enzyme was achieved in 1-2 min. The red color (‘a’ value) increased in aqua-gas and superheated steam blanched samples by 54-46%, respectively, on skin side. The hardness value measured from skin side significantly reduced (up to 39%) in all the samples. AQG and SHS blanched samples required 6 h for drying (60°C). AQG and SHS blanched samples had higher rehydration moisture. About pasteurization, no viable spores were present in samples processed with AQG and SHS for 1 min, which could be attributed to washing of spores during steam treatment. The results indicated that AQG could be effectively used for blanching as well as for pasteurization.