

Parisut Songtip 2013: Development of Extruded Snacks from Germinated Khao Dawk Mali 105 and Hom Nin Brown Rice Flour Fortified with Xanthones. Doctor of Philosophy (Agro-Industrial Product Development), Major Field: Agro-Industrial Product Development. Department of Product Development. Thesis Advisor: Associate Professor Kamolwan Jangchud, Ph.D. 191 pages.

The objectives of this study were to determine effects of storage duration of paddy rice and pH levels of steeping water during germination on physicochemical properties of germinated brown rice flour (GBRF) prepared from two rice varieties (Khao Dawk Mali 105 (KM) and Hom Nin (HN)) and to develop extruded snacks from those flours by a twin-screw extruder that were acceptable to consumers. A 6x2 factorial arrangement in a completely randomized design (CRD) with six storage periods (2, 4, 6, 8, 10, and 12 months) and two steeping conditions (in a buffer solution at pH 3 and in reverse osmosis water at pH 6.8) for 48 h were used. Both germinated brown rice flour (GBRF) obtained from paddy rice stored for 6 to 10 months and germinated at pH 3 yielded the high free gamma-aminobutyric acid (GABA) content (83 to 99 mg/100 g flour for GBRF from KM (GKMF) and 30 to 42 mg/100 g flour for GBRF from HN (GHNF)). Extruded snack formulation 90.5% of GBRF (obtained from steeping at pH 3 for 48 h), 9.05% of soy protein isolate and 0.45% of CaCO₃ was used to study the effect of extrusion conditions on physicochemical and sensory properties of extruded snacks. A 3x3 factorial arrangement in CRD was used: three levels of feed moisture (14, 18 and 22%) and three levels of screw speed (300, 350 and 400 rpm). The results showed that increasing the feed moisture caused an increase in bulk density and hardness, but a decrease in expansion ratio. Increasing feed moisture increased retention of free GABA. Total phenolic content (TPC), 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical-scavenging activity and ferric reducing antioxidant power (FRAP) of extrudates from both rice varieties were decreased when compared with those of the non-extruded. Optimum conditions to produce extruded snack obtain high free GABA and acceptable for consumer predicted by regression model for GKMF and GHNF were 16 to 19% of feed moisture and 300 to 310 rpm of screw speed and 14 to 19 % of feed moisture and 300 to 400 rpm of screw speed, respectively. Both GBRFs mixed with crude xanthone powder was used to study the effect of barrel temperature (120, 140 and 160°C) on physicochemical properties of extrudates. The result showed that increasing barrel temperature caused an increased in expansion ratio, but a decrease in a_w, bulk density and hardness. Increasing barrel temperature increased retention of TPC, DPPH radical-scavenging activity and FRAP. However, free GABA and α-mangostin content of extrudates were decreased. Regarding consumer acceptability (n=200 for Thai and 100 for US. consumers), the mean overall liking scores of developed snack from GKMF was slightly higher (7.4 for both Thai and US. consumers) than the GHNF (7.0 for both Thai and US. consumers). This study demonstrated the feasibility of producing highly nutritious extruded snacks from GBRF that were acceptable to both Thai and US. consumers.

Student's signature

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