Title Effect of gamma-irradiation treatment before drying on qualities of dried rice

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**Abstract**

Rice, pretreated by $^{60}$Co gamma irradiation, was dried by hot-air with irradiation dosage 0–10 kGy, drying temperature 30–50 °C, and initial moisture contents 20–30% (drying basis). The drying characteristics and dried qualities of rice were evaluated based on drying time, average dehydration rate, apparent amylose content (AAC), gel consistency (GC) and gelatinization temperature (GT). A quadratic rotation-orthogonal composite experimental design, with three variables (at five levels) and five response functions, and analysis method were employed to study the effect of three variables on the individual response functions. The five response functions (drying time, average dehydration rate, AAC, GC, GT) correlated with these variables by second order polynomials consisting of linear, quadratic and interaction terms. A high correlation coefficient indicated the suitability of the second order polynomial to predict these response functions. The linear effects of three variables on the five response functions were all significant. The interaction effect of drying temperature × initial moisture content on drying time was significant, the interaction effect of irradiation dosage × drying temperature on average dehydration rate was significant, and the other interaction effects on response functions were not significant. The quadratic effects of irradiation dosage on apparent amylose content, gel consistency, and gelatinization temperature were significant, and that of drying temperature on drying time, average dehydration, and gel consistency were significant, and that of initial moisture content on average dehydration and gel consistency were significant. The optimum levels of these three variables for obtaining optimum magnitude (maximum or minimum) of the five response functions were obtained. As a result of optimization analysis, 10 kGy irradiation dosage was required for optimum magnitude of all the five response functions, but drying temperature and initial moisture content were required differently for maximum or minimum of response function values.