

**FRGS RESEARCH GRANT  
FINAL REPORT**

**STRUCTURAL-FUNCTIONALITY CHANGES OF  
STARCHES INDUCED BY GAMMA IRRADIATION  
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## ABSTRACT

This study reported is part of the attempt to elucidate how amylose-to-amylopectin ratio in starch would affect the gamma irradiation. Corn starches with different amylose-to-amylopectin ratio (waxy, normal, Hylon V, and Hylon VII) were treated with five doses of gamma irradiation (1 kGy, 5 kGy, 10 kGy, 25 kGy, and 50 kGy). The effects of gamma irradiation on the physicochemical and the morphology properties of starch samples were investigated. Results obtained showed that the reduction in apparent amylose content increased with the amylose-to-amylopectin ratio in the starches when underwent irradiation at 25 kGy and 50 kGy. DSC study indicated that starches under dense suspension displayed similar thermal behaviours as compared to the watery one ( $p>0.05$ ). A significant decrease in the gelatinization temperatures was observed for Hylon V, Hylon VII and waxy samples that were irradiated with 25 kGy and 50 kGy respectively. In general, the enthalpies for all starches were not much affected. It is noteworthy also that the thermal behaviours of normal starch were only marginally affected even irradiated up to 50 kGy. The pasting profile of all starches showed significant decrease with increased irradiation dosages in which low amylose starches were severely degraded when irradiated at 25 kGy and 50 kGy. XRD studies revealed that gamma irradiation caused the decrease in relative crystallinity for all starches with low amylose starches experienced massive reduction. However no significant effect of gamma irradiation on the crystal pattern was identified for all starches. Generally, the granules of all irradiated starches remained intact but some granules of Hylon V and Hylon VII were found to be fractured under SEM. In conclusion, the higher the irradiation dosage, the more severe the degradation was observed on starches. However, the extent of alteration was reflected differently in different kind of physicochemical properties investigated in which the pasting properties and XRD analysis were more drastically affected by gamma irradiation, while thermal behavior and morphological properties of the starches were affected less.