EXTRUDED/INJECTION-MOLDED COMPOSITES CONTAINING UNRIPE PLANTAIN FLOUR, ETHYLENE–VINYL ALCOHOL, AND GLYCEROL: EVALUATION OF MECHANICAL PROPERTY, STORAGE CONDITIONS, BIODEGRADABILITY, AND COLOR.

ABSTRACT

Extruded/injection-molded composites of excellent mechanical property were produced from plantain flour (PF) blended with ethylene–vinyl alcohol (EVA) and glycerol. Scanning electron microscopy (SEM) revealed that composites had a smooth surface, indicative of an excellent compatibility between PF, EVA, and glycerol. Generally, tensile strength (TS), elongation at break (%E), and the displacement (DM), all decreased with increased PF content in the composite accompanied by an increase in Young's modulus (*M*). The composites with higher PF contents (60% or higher) had more stable mechanical properties. Selected composites (60% PF content) stored at −20°C and 4°C for 40 h showed only minor changes in mechanical properties compared with controls (23°C). However, samples stored for a similar period at 80°C were drastically altered in their mechanical properties resulting in huge increases in TS and *M* and a 10-fold decrease in the %E. Samples prestored at various relative humidities (RHs) for 40 h exhibited only slight decrease in TS and *M* and a concomitant increase in the %E with increased RH. Interestingly, sample prestored at both −20°C and 80°C exhibited significantly higher rates and extents of degradation. SEM analysis of samples left in compost for 8 weeks showed a rapid surface erosion and material deterioration with time. Evaluation of the color produced during heat processing of starch in PF as a result of Maillard reaction showed an increase in the values of luminosity (*L**), chroma (*C**), and hue angle (*h**) with decreased PF content in the composite. J Appl Polym Sci, 2012.

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