EFFECT OF THREE DIFFERENT PACKAGING MATERIALS ON COLOUR AND MOISTURE CONTENT OF DEHYDRATED GARLIC POWDER DURING STORAGE


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Garlic (Allium sativum L.) is a compound bulb, which comprises small bulbs called cloves, enclosed within a white membranous outer casing. It is categorized under semi-perishable spices. Hanging in mesh bags, freezing, storing in vinegar or oil and drying are the methods used to extend shelf life of fresh produce. However, moisture loss due to respiration during storage and transportation and microbial spoilage are the major causes, which limit shelf life of fresh garlic. Difficulties of garlic storage in fresh form have generated an interest in the development of dehydrated garlic products such as cloves, granulates, powder, and flakes. Garlic powder is cream to white in colour with a strongly persistent and characteristic odour and flavor when rehydrated. Food packaging has a role to retard product deterioration, retain the beneficial effects of processing, extend shelf-life and maintain or increase the quality and safety of food. This study was conducted to identify packaging material that can be used in long term storage of garlic powder and to evaluate the changes in moisture absorption and colour deterioration in each packaging tested. Garlic bulbs free of damages and diseases were purchased from the local market and transported to food processing laboratory of Institute of Postharvest Technology (IPHT) in Anuradhapura, Sri Lanka. The bulbs were decloved and peeled manually, sliced into 5 mm thickness using stainless steel knife and put into water while slicing. Then slices were drained and soaked in aqueous solution of 0.1% sodium metabisulphite for 2 min, dried in an electrical oven for 2 h at 60 ± 1°C followed by continuous drying at 55 ± 1°C until slices got 7 ± 1% moisture content. Dried slices were powdered using a laboratory scale grinder, sieved and packaged in 10×15 cm size bags of three different packaging materials; Polypropylene (PP), Biaxially oriented polypropylene/Cast Polypropylene (BOPP/CPP; Laminates) and Low density polyethylene/Metalized polyethylene terephthalate (LDPE/MPET; Metallized film) containing 100 g of garlic powder and sealed using plastic film sealer (Brother PCS 200/300). Samples were kept at room temperature (30 ± 2°C, 60 ± 5% RH) for six months. Changes in moisture content and colour were measured at one month interval. The experiment was laid out in a complete randomized design and each treatment consisted of triplicate. Data were analyzed by Analysis of Variance (ANOVA) using Statistical Analysis System (SAS) for windows version 9.0. Differences between treatment means were obtained by Duncan’s multiple range test at 5% significance level (p<0.05). Results revealed that increments in the moisture content of garlic powder in different packaging materials were significantly different (P < 0.05). Accordingly, PP material has absorbed highest moisture of 5.26% and lowest 0.86% was recorded from LDPE/MPET while BOPP/CPP had 3.61% at the end of the storage period. Garlic powder packaged in all packaging materials had shown reduction in Lightness value (L*) value during storage. However, L* value of MPET was significantly higher (P= 0.0036) at the end of the storage. Thus, MPET material can be recommended for six month storage of garlic powder that has lowest colour change and moisture increment. BOPP/CPP (Laminated material) can be recommended for short term storage up to 3 months. However, PP is not suitable as a packaging material for storage of garlic powder. Further, studies are needed to evaluate methods to minimize the colour changes of the Garlic powder.