

## Evaluation of the quality stability on the soybean flour depending on storage conditions

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### Abstract

Legumes are good sources of various nutrients. Among legumes, soybean and its flour are accessible foods to consumers. However, in case of soybean flour, there is a disadvantage of easily going rancid. Thus, this study aimed to investigate how the quality of soybean flour changes during storage according to the packaging materials and storage temperatures. The raw and roasted soybean flours were packed in two types of packaging, polyethylene (PE) and polypropylene (PP) film bags respectively, and stored at three different storage temperatures (4, 20, and 45 °C) for 1 year. The acid value, conjugated diene value, peroxide value, *p*-anisidine value, thiobarbituric acid (TBA) value, lipoxygenase activity, and fatty acid content of raw and roasted soybean flours were measured at the point of starting storing, and after 1, 2, 4, 8, and 12 weeks of storage. The acid value of soybean flour was increased for 4 weeks and thereafter significantly decreased ( $p < 0.0001$ ). The conjugated diene value was significantly increased after 4 weeks storage at 45 °C with PE and PP film bags ( $p < 0.0001$ ). The peroxide value had no changes during 4 weeks storage at 45 °C with PE and PP film bags, and then those was dramatically increased after 8 weeks ( $p < 0.0001$ ). The *p*-anisidine values in all of storage conditions were decreased after 4 weeks. Lipoxygenase activity was decreased at 12 weeks storage at 20 °C and 45 °C with PP film bags. Acid value had positive correlations with *p*-anisidine value ( $r = 0.30$  and  $p < 0.0001$ ) and lipoxygenase activity ( $r = 0.36$  and  $p < 0.0001$ ), and had negative correlations with conjugated diene value ( $r = -0.45$  and  $p < 0.0001$ ) and peroxide value ( $r = -0.25$  and  $p < 0.001$ ). Conjugated diene value had a high positive correlation with peroxide value ( $r = 0.76$  and  $p < 0.0001$ ), but that had a negative correlation with lipoxygenase activity ( $r = -0.51$  and  $p < 0.0001$ ). Peroxide value had negative correlations with *p*-anisidine value ( $r = -0.20$  and  $p < 0.01$ ) and TBA value ( $r = -0.15$  and  $p < 0.05$ ). The degree of reduction in fatty acid content of raw soybean flour was higher than the roasted soybean flour during the storage. Total fatty acid content had positive correlations with acid value ( $r = 0.45$  and  $p < 0.0001$ ) and *p*-anisidine value ( $r = 0.58$  and  $p < 0.0001$ ), but had a weak negative correlation with conjugated diene value ( $r = -0.19$  and  $p < 0.01$ ). This study showed how the rancidity of the raw and roasted soybean flours progressed during storage. Thus, our findings can be used as base data to do a further study of finding and developing more stable storage conditions of the soybean flour.

Keywords: soybean flour, quality, stability, storage

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