

Abstract

The degreening of soybean seeds was studied relative to their maturity stage, moisture content at harvest and postharvest drying temperature. Studies were performed on Brazilian soybean over its whole maturation period (R_6 – R_8) according to the Fehr and Caviness scale. Chlorophyll and its colored derivatives were quantified as a function of three drying conditions: slow drying at room temperature (25 °C) and oven drying at 40 and 75 °C in order to quantify degreening and pigments produced under these temperatures. Pathways for chlorophyll degradation, enzymatic, chemical or both, could be elucidated by this experimental design. Pigments were quantified by HPLC and identities were confirmed by spectral characteristics, retention times and plasma desorption mass spectrometry (PDMS). Postharvest drying at 25 °C allowed almost complete degradation of chlorophyll in seeds harvested at maturity stage R_6 (Fehr scale) or later, with no green pigment detected, which mimics maturation in the field. Fast drying at 40 or 75 °C blocked the breakdown process at all stages of maturity and only seeds harvested at R_8 lost their green color. At 40 °C, chemical and/or enzymatic mechanisms of degradation seemed to have occurred, the former is supported by high levels of pheophytins and the latter, by the appearance of small amounts of chlorophyllides and pheophorbides. At 75 °C, considerable levels of only chlorophylls and pheophytins were observed probably due to the inactivation of enzymes. So, chemical pheophytinization was the primary mechanism of degradation. It was concluded that the degree of maturation at harvest time and the temperature of postharvest drying significantly affect the chlorophyll content of soybeans. In order to avoid retention of chlorophyll and to guarantee marketing quality of seeds, harvesting at full maturity followed by fast or slow drying is suggested. If premature harvesting is necessary, the drying should be performed at temperatures lower than 40 °C or seed quality can be compromised.