Carioca beans have their technological quality reduced during storage due to the phenomena of hardening and darkening. Oxidoreductases such as polyphenoloxidases (PPO) and peroxidases (POD) are the main components associated to those processes because they oxidize phenolic compounds, producing colorful metabolites and lignin precursors. The objective of this work was to evaluate PPO and POD activities in two contrasting carioca beans cultivars for darkening and hardening. Grains were stored at 40°C, 70% relative humidity in the dark for 4 months. Enzyme activities (EA) were tested monthly in cotyledon and tegument, using catechol as substrate. Changes in tegument color was quantified in a colorimeter by recording L*, a* and b* values and hardness of cooked grains was measured in a Texture Analyser. There was no EA of POD in tegument. POD activity of cotyledon decreased, although BRS-Pontal presented EA much higher than BRSMG-Madrepérola. PPO activity in cotyledon of BRSMG-Madrepérola was higher in recent harvested grains and decreased during storage. BRS-Pontal increased its PPO activity after one month of storage and then decreased again. Freshly grains presented PPO activity in tegument around 1 enzyme unit (EU). BRSMG-Madrepérola maintained this value during storage and BRS-Pontal increased up to 14 EU. Hardness of BRSMG-Madrepérola and BRS-Pontal increased 83% and 252%, respectively. BRSMG-Madrepérola was stable to darkening (7.4% luminosity reduction) compared to BRS-Pontal (21.7%). Grains also increased their a* and b* chromaticity. Apparently, darkening is due to non-enzymatic reactions. Hardening seems to be related to POD activity. PPO and POD remain active during storage.