

Capsaicin and dihydrocapsaicin determination in chili pepper genotypes using ultra-fast liquid chromatography

Abstract

Research was carried out to estimate the levels of capsaicin and dihydrocapsaicin that may be found in some heat tolerant chili pepper genotypes and to determine the degree of pungency as well as percentage capsaicin content of each of the analyzed peppers. A sensitive, precise, and specific ultra fast liquid chromatographic (UFLC) system was used for the separation, identification and quantitation of the capsaicinoids and the extraction solvent was acetonitrile. The method validation parameters, including linearity, precision, accuracy and recovery, yielded good results. Thus, the limit of detection was 0.045 $\mu\text{g}/\text{kg}$ and 0.151 $\mu\text{g}/\text{kg}$ for capsaicin and dihydrocapsaicin, respectively, whereas the limit of quantitation was 0.11 $\mu\text{g}/\text{kg}$ and 0.368 $\mu\text{g}/\text{kg}$ for capsaicin and dihydrocapsaicin. The calibration graph was linear from 0.05 to 0.50 $\mu\text{g}/\text{g}$ for UFLC analysis. The inter- and intra-day precisions (relative standard deviation) were <5.0% for capsaicin and <9.9% for dihydrocapsaicin while the average recoveries obtained were quantitative (89.4%–90.1% for capsaicin, 92.4%–95.2% for dihydrocapsaicin), indicating good accuracy of the UFLC method. AVPP0705, AVPP0506, AVPP0104, AVPP0002, C05573 and AVPP0805 showed the highest concentration of capsaicin (12,776, 5,828, 4,393, 4,760, 3,764 and 4,120 $\mu\text{g}/\text{kg}$) and the highest pungency level, whereas AVPP9703, AVPP0512, AVPP0307, AVPP0803 and AVPP0102 recorded no detection of capsaicin and hence were non-pungent. All chili peppers studied except AVPP9703, AVPP0512, AVPP0307, AVPP0803 and AVPP0102 could serve as potential sources of capsaicin. On the other hand, only genotypes AVPP0506, AVPP0104, AVPP0002, C05573 and AVPP0805 gave a % capsaicin content that falls within the pungency limit that could make them recommendable as potential sources of capsaicin for the pharmaceutical industry.

Keyword: Capsaicin; Dihydrocapsaicin; Ultra-fast liquid chromatography; Chili pepper; Scoville heat units