CAROTENOID STABILITY AND BIOAVAILABILITY FROM LYCOPENE-RICH CARROTS WITH RESPECT TO PARTICLE SIZE DISTRIBUTION OF WET GROUND CARROT PUREES

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Due to the combined or even synergistic health effects of a wide range of secondary plant metabolites (SPS), a high fruit and vegetable consumption is assured nowadays to reduce the risk for certain cancers and degenerative diseases. Many SPS, e.g. carotenoids, are very strongly associated with plant tissues and their bioavailability is often quite low. Therefore, we investigated carotenoid stability and release from tissue during wet grinding (stirred media bead mill) of blanched (96°C, 3min) *Nutri red* carrots to produce plant material with particle size distributions in the submicrometer range and cellular carotenoid uptake by human intestinal Caco-2 cells *in vitro*. Carrot purees with Sauter mean diameters (d_{32}) in the range from 195 ± 9 µm (coarse milling) and 70 ± 4 µm to 0.3 ± 0.04 µm (bead milling) with correspondingly high volume specific surfaces but reduced carotenoid contents (18%) were obtained. No toxic effect was observed during incubation of Caco-2-cells. The cellular uptake of all-*trans*-beta-carotene and all-*trans*-lycopene from the puree with d_{32} 0.3 ± 0.04 µm was enhanced about 2-fold and 3-fold, respectively, compared to the coarsely milled puree (d_{32} 195 ± 9 µm). The results indicate that the particle size distribution of plant material products could have a significant effect on the availability of bioactive components. Taking the slight decrease in carotenoid contents into account, comminution processes may be applied in order to gain added values from the very large quantities of pomace rich in bioactive secondary plant metabolites from industrial vegetable and fruit juice production.

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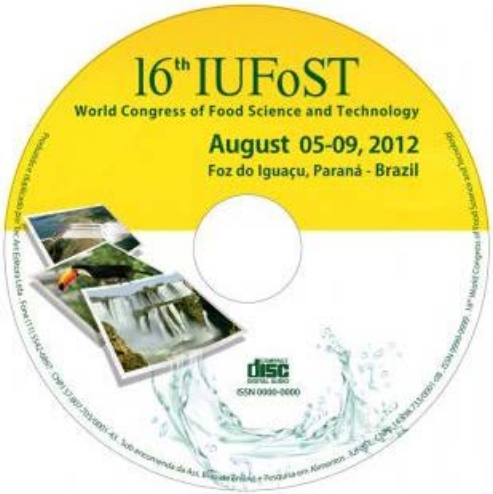

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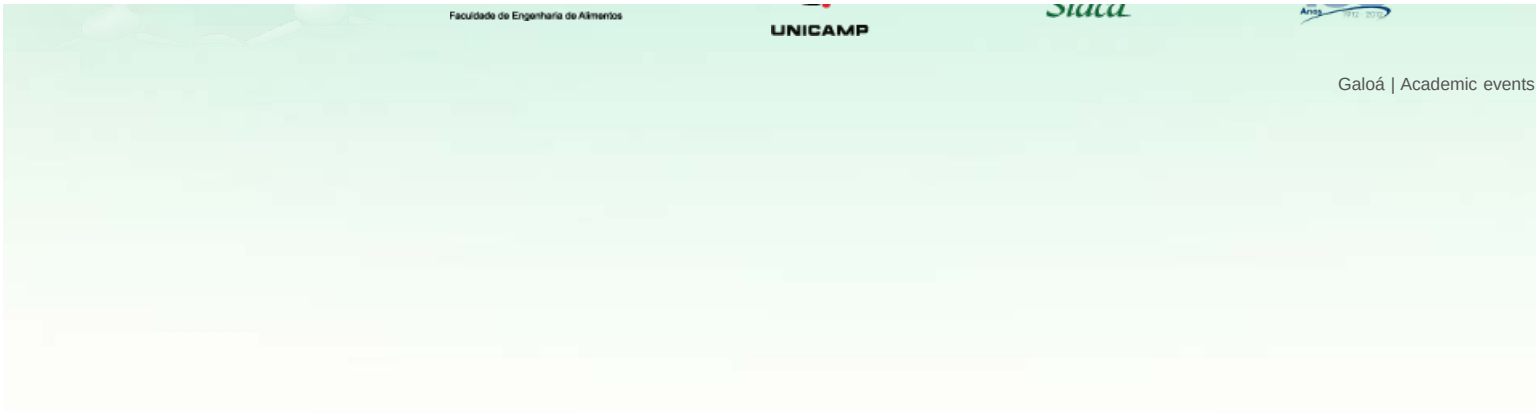

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