An analytical method for separation and quantitative determination of nine dithiocarbamates (DTCs) in fruits and vegetables by using LC-MS/MS was developed, validated and applied to samples purchased in local supermarkets. The nine DTCs were ziram, ferbam, thiram, maneb, zineb, nabam, metiram, mancozeb and propineb. Validation parameters of mean recovery for two matrices at two concentration levels, relative repeatability (RSDr), relative within-laboratory reproducibility (RSDR) and LOD were obtained for the nine DTCs. The results from the analysis of fruits and vegetables served as the basis for an exposure assessment within the given commodities and a risk assessment by comparing the calculated exposure to the acceptable daily intake and acute reference dose for various exposure groups. The analysis indicated positive findings of DTCs in apples, pears, plums, table grapes, papaya and broccoli at concentrations ranging from 0.03 mg/kg to 2.69 mg/kg expressed as the equivalent amount of CS2. None of the values exceeded the Maximum residue level (MRL) set by the European Union, and furthermore, it was not possible to state whether illegal use had taken place or not, because a clear differentiation between the various DTCs in the LC-MS/MS analysis was lacking. The exposure and risk assessment showed that only for maneb in the case of apples and apple juice, the acute reference dose was exceeded for infants in the United Kingdom and for children in Germany, respectively.