Active Recombinant Thioredoxin h Protein with Antioxidant Activities from Sweet Potato (Ipomoea batatas [L.] Lam Tainong 57) Storage Roots

Abstract

Recombinant thioredoxin h (Trx2) overproduced in Escherichia coli (M15) was purified by Ni2+-chelated affinity chromatography. The molecular mass of Trx2 is 1.4 kDa as determined by sodium dodecyl sulfate−polyacrylamide gel electrophoresis. Total antioxidant status, 1,1-diphenyl-2-picrylhydrazyl (DPPH) staining, reducing power method, Fe2+-chelating ability, ferric thiocyanate (FTC) method, and protection of calf thymus DNA against hydroxyl radical-induced damage were studied. The thioredoxin h protein with a concentration of 12.5 mg/mL exhibited the highest activity (expressed as 0.37 ± 0.012 mM ABTS• radical cation being cleared) in a total antioxidant status test. In the DPPH staining thioredoxin h appeared as white spots when it was diluted to 50 mg/mL (a final amount of 15 μg). Like the total antioxidant status, the reducing power, Fe2+-chelating ability, FTC activity, and protection against hydroxyl radical-induced calf thymus DNA damage were found with the thioredoxin h protein. It was suggested that thioredoxin h might contribute to its antioxidant activities against hydroxyl and peroxyl radicals.