The Effect Of Freeze Drying And Hot Air Drying On The Antioxidants Of Yam

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ABSTRACT

ABSTRACT In this research, Ming-jian flesh-reddened yams (D. alata L. var. purpurea (Roxb.) M. Pouch) (No.70R20) were studied. The flesh and skin of the yam tubers were blanched, freeze dried, and hot air dried. The antioxidant components of these samples were extracted using methanol . The antioxidant properties including the reducing power, the ferrous ion chelating power, and the free radical α, α-diphenyl-β-picryl-hydrazyl (DPPH) scavenging activity, were measured and compared with those of butylated hydroxyanisole (BHA) and alpha-tocopherol. In the analysis of reducing power, it was found that the reducing power of the yam flesh increased with the increase of the ratio of sample weight/solvent volume. Compared with BHA and alpha-tocopherol in the same concentration, the methanolic extracts of the yam flesh treated with different drying methods had the lowest value. The reducing power of the methanolic extract of the freeze dried yam skin had higher value. The reducing power of the methanolic extract of the hot air dried yam skin was good when the ratio of sample weight /solvent volume was 4mg/ mL. The methanolic extracts of yam after different drying treatments were still lower than BHA and alpha-tocopherol in the reducing power. In the analysis of ferrous ion chelating power, the methanolic extracts of the yam flesh dried by different treatments were the highest in ferrous ion chelating power with the value around 85%. BHA and alpha-tocopherol exhibited no ferrous ion chelating power. The methanolic extract of the hot air dried yam skin was stronger than freeze dried yam skin in the ferrous ion chelating power. The methanolic extracts of the yam skin after different drying treatments were had an increasing followed by decreasing clelating power as the ratio of sample weight/solvent volume increased. In the analysis of DPPH scavenging activity, BHA and alpha-tocopherol had the highest scavenging activity. The DPPH scavenging activity of the methanolic extracts of the yam flesh treated with different drying methods were getting greater with the increase of the ratio of sample weight /solvent volume. The methanolic extract of the freeze dried yam skin had a higher DPPH scavenging activity. With the increase of the ratio of sample weight /solvent volume, the DPPH scavenging activity of the hot air dried yam skin methanolic extract had higher scavenging activity and was close to alpha-tocopherol ,freeze dried yam skin methanolic extract lower than BHA.. In the analysis of antioxidant components of the methanolic extracts treated with different drying methods, the results showed that the freeze dried yam skin had the highest quantity of polyphenols with 33.05 mg per gram, which was 5.2 ~ 5.6 times higher than the yam flesh ,and was 1.6 times higher than the hot air dried yam skin. In the analysis of flavonoids, the freeze dried yam skin had the highest quantity. In the analysis of ascorbic acid, the freeze dried yam flesh had the highest quantity. Four yam samples treated with different drying methods were all lower in ascorbic acid. In the test of the storage stability, the yam samples treated with different drying methods did not have a great change in ascorbic acid, flavonoids, and polyphenols, after they had been stored for eight weeks. They also made no obvious change in color. In water quantity, the hot air dried yam samples had a greater change with the increase of the storage time. All the results showed that the methanolic extracts of the freeze dried yam skin had the highest quantities of flavonoids and polyphenols in the quantitative analysis of the antioxidant components. Besides, because of its good reducing power and DPPH scavenging activity, the yam skin classified as farming waste is worth studying to enhance its value. KEY WORDS: yam, yam flesh, yam skin, freeze dried, hot air dried, antioxidant properties.

Keywords : yam ; yam flesh ; yam skin ; freeze dried ; hot air dried ; antioxidant properties

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