

Development of Potato Varieties with High Antioxidant Activities By Analysis of Phenolic Compounds in Different Parts of Potato Tubers

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This study was carried out to select potato varieties and clones with high antioxidant activity as well as superior agronomic traits such as yield, hollow heart, internal brown spot, and common scab resistance. In 2001, diverse potato genetic resources were evaluated on the basis of antioxidant activity (RC 50 value), and there were significant differences on antioxidant activities, ranging from 32.4 to 246.8 μl . 'Atlantic', well-known as a chipping variety, showed very low antioxidant activity of 210.6 μl . The five clones were finally selected for their high yield and other agronomic traits in addition to high antioxidant activities, later named as 'Bora valley' (dark purple color in skin and fresh), 'Rose valley' (red skin and yellow fresh), 'Gogu valley' (red skin and cream fresh), 'Stick valley' (yellow skin and cream fresh), and 'Golden valley' (yellow in skin and fresh), and evaluated further in 2002 for their antioxidant activities in different sections of the tuber. The RC50 value in whole tuber of 'Bora valley' is 28.29 μl , the greatest antioxidant capability value and that of 'Golden valley' is 107.1 μl , the lowest of all selected varieties. The antioxidant activities and phenolic acids: chlorogenic acid (CGA), caffeic acid (CFA), and ferulic acid (FA) in three sections of potato tuber (Section I of skin and cortex, Section II of peridedullary tissue, Section III of pith portion of pillar body) of these five Valley cultivars were evaluated by DPPH and HPLC methods. Antioxidant activities of tuber section I were 22.6 μl for 'Bora valley', 60.3 μl for 'Rose valley', 76.1 μl for 'Gogu valley', 81.8 μl for 'Stick valley', and 97.1 μl for 'Golden valley', respectively, while there is almost no antioxidant activity (higher than 200 μl in RC 50) detected in tuber section II and III in all varieties except for 'Bora valley', in which 33.3 μl and 75.2 μl of RC 50 value were measured for section II and section III, respectively. Based on the relationship of potato skin color (section I) and the antioxidant activities, purple is higher than red, and red is higher than yellow skinned tuber in their antioxidant activities. Furthermore, the concentrations of three kinds of phenolic acids and antioxidant activity are closely related, and the correlation coefficients of CGA, CFA, and FA in Section I and whole tuber are -0.899, -0.932, -0.990 and -0.939, -0.932, -0.991, respectively.