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Comparative Analysis of Total Phenolic Content and Antioxidant Activities of Black Soybeans with Different Seed Weight

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The phenolic contents in soybean seeds are affected by genetic and environmental factors. In the present study, 24 black soybeans and a control variety were grown in Korea and grouped as small (<13 g), medium (13 – 24.0 g), and large (>24 g) based on their seed weight. The total phenolic content (TPC) and antioxidant activities were analyzed and compared with their seed weight. The TPC was in the ranges 2.016 – 5.535, 1.992 – 4.679, and 1.829 – 4.621 mg GAE/g in small, medium, and large seeds with an average of 3.824, 3.108, and 3.626 mg GAE/g, respectively. The FRAP and DPPH activities were in the ranges 4.327 – 6.394 and 0.354 – 0.403 mg AAE/g in small seeds, 2.510 – 6.147 and 0.356 – 0.417 mg AAE/g in medium seeds, and 3.024 – 6.389 and 0.344 – 0.405 mg AAE/g in large seeds, respectively. Besides, ABTS activity was in the ranges 4.833 – 4.967, 3.636 – 4.871, and 4.554 – 4.956 mg TE/g in small, medium, and large seeds, respectively. Small seeds had the highest average FRAP (5.498 mg AAE/g) and ABTS (4.902 mg TE/g) activities while large seeds showed the highest average DPPH (0.387 mg AAE/g) activity although the variations were not significant ($p > 0.05$). TPC showed positive correlation with every antioxidant activity. However, the TPC correlation was significant ($p < 0.05$) only with DPPH ($r = 0.673$). Overall, small seeds presented a relatively high TPC and maximum antioxidant activities. Hence, black soybeans with small seeds could be important sources of high phenolic concentration and provide improved health benefits.

Key words: Antioxidant activities, Black soybeans, Phenolic content, Seed weight

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