

**Anti-oxidative activities of sorghum, foxtail millet and proso millet extracts**

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**Objectives**

In this present study, we report the anti-oxidant properties of different cultivars of sorghum, foxtail millet and proso millet. To obtain a better understanding of the potent antioxidant extracts, we determined the amount of phenols and flavonoids in these crops, and analyzed anti-oxidant properties using various assays, including DPPH radical scavenging, ferric ion reducing anti-oxidant power assay and anti-lipid peroxidative effect.

**Materials and Methods**

◦ Plant materials

Sorghum (Korean name; susu), foxtail millet (Jo) and proso millet (Gijang) cultivar were provided by the Shinlim Agricultural Cooperative, Wonju-si, Gangwon-do, Korea.

◦ Methods

DPPH radical scavenging assay

Determination of reducing power activity

Total phenol and flavonoid analysis

Ferric thiocyanate (FTC) test

**Results and Discussion**

In this study, sorghum, foxtail millet and proso millet extracts were evaluated by various in vitro antioxidant assays, including 1,1-diphenyl-2-picryl-hydrazyl (DPPH) free radical scavenging activity, reducing power by Fe<sup>3+</sup>-Fe<sup>2+</sup> transformation, and anti-lipid peroxidative activity by ferric thiocyanate. The sorghum extract contained high amount of phenolic compounds as well as a high level of antioxidant activity compared with foxtail millet and proso millet extracts. In addition, among the sorghum cultivar, me-susu (Sorghum dochna var. technicum, Snowden) extracts exhibited high levels of free radical scavenging activity, anti-oxidant capacity and anti-lipid peroxidative activity compared with α-tocopherol. Taken together, these findings suggest that me-susu extracts can be considered good sources of natural anti-oxidants.

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Table 1. Total phenolic content, total flavonoid content and DPPH free radical scavenging activity of sorghum, foxtail millet and proso millet extracts.

	Cultivar	Remark	RC <sub>50</sub> <sup>a</sup>	TPC <sup>b</sup>	TFC <sup>c</sup>
Foxtail millet (Jo)	Gaebalcha-jo	JO-1	254 ± 10	20.1 ± 0.2	6.7 ± 1.6
	Kkojang-jo	JO-2	259 ± 14	19.4 ± 0.2	9.1 ± 0.8
	Nuzz-jo	JO-3	270 ± 11	18.0 ± 2.3	5.7 ± 0.4
	Mongdang-jo	JO-4	230 ± 4.6	20.5 ± 0.4	3.4 ± 0.2
	Sangjung-jo	JO-5	267 ± 12	17.7 ± 1.1	5.3 ± 0.0
	Shinnalgeori	JO-6	196 ± 6.4	26.5 ± 0.8	11.5 ± 0.6
	Oruncha-jo	JO-7	318 ± 14	18.4 ± 0.7	5.9 ± 0.0
	All-jo	JO-8	250 ± 7.5	20.5 ± 0.1	6.4 ± 0.1
Proso millet(Gijang)	Bulgun-gijang	GJ-1	122 ± 5.1	21.6 ± 0.6	8.0 ± 0.2
	Byolook-gijang	GJ-2	58 ± 2.2	26.7 ± 0.6	8.1 ± 0.2
	Chal-gijang	GJ-3	297 ± 6.0	12.0 ± 0.4	4.0 ± 0.1
	Hwang-gijang	GJ-4	192 ± 2.9	16.0 ± 0.4	5.5 ± 0.1
	Heuin-gijang	GJ-5	205 ± 1.7	14.5 ± 0.3	6.2 ± 0.3
Sorghum(Susu)	Mongdang-susu	SS-1	3.1 ± 0.1	181.5 ± 2.0	29.0 ± 0.2
	Me-susu	SS-2	1.9 ± 0.1	263.3 ± 16.0	33.7 ± 0.6
	Susongsaengi-susu	SS-3	6.4 ± 0.1	105.7 ± 5.9	31.5 ± 0.8
	Sikyung-susu	SS-4	4.3 ± 0.0	153.6 ± 10.6	38.1 ± 0.4
	Jangsu-susu	SS-5	8.4 ± 0.2	72.8 ± 0.3	23.0 ± 4.7
	Heuin-susu	SS-6	31 ± 1.4	28.5 ± 0.6	14.5 ± 0.0
Positive control	Ascorbic acid		1.1 ± 0.0		
	$\alpha$ -Tocopherol		3.3 ± 0.1		
	BHA		5.0 ± 0.2		
	BHT		56 ± 4.3		

<sup>a</sup>RC<sub>50</sub>: Amount required for the 50% reduction of DPPH after 30min.

Each value is mean ± standard derivation of triplicate experiments.

<sup>b</sup>Total phenol content analyzed as gallic acid equivalent (GAE) mg/g of extract, values are the average of triplicate experiments.

<sup>c</sup>Total flavonoid content analyzed as quercetin equivalent (QE) mg/g of extract, values are the average of triplicate experiments.