

## Antioxidant Enzyme Activities of the Cosmetic Composition having Natural Plant Pigments and extracts of different partition layers in *Dioscorea japonica*

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천연색소와 야생 참마 분획물을 함유한 화장품 조성물의 항산화효소 활성

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### Objectives

This experiment was conducted to clarify the biological activity of the cosmetic composition having plant pigments and *Dioscorea japonica*, and to enhance the natural materials utilization of cosmetics. In order to determine the biological activity, we investigated the antioxidant enzyme activities according to different fraction in *Dioscorea japonica*. In this study, we conjectured that the plant pigment and *Dioscorea japonica* had the potent biological activities, therefore these plant resources having antiaging components could be a good materials for development into source of natural cosmetics.

### Materials and Methods

#### ○ Experimental Materials

The plant materials were used the fifteen kind (black rice, purple sweet potato, yellow bitter melon, yellow paprika, red cabbage, yellow gardenia, blue gardenia, chinese foxglove, mulberry leave, onion peel, grape peel, mulberry, red beet, gromwell, cactus) of natural plant pigments and wild yam (*Dioscorea japonica*).

#### ○ Methods

Activities of SOD, APX and CAT were measured by spectrophotometry (Arruda *et al.*,1996; Bai *et al.*,1999)

### Results and Discussions

The cosmetic composition having EtOAc fraction of *Dioscorea japonica* had the highest SOD enzyme activity, while the BuOH fraction and EtOH fraction was comparatively low. The activity of CAT and APX showed a relatively high in the EtOAc fraction and BuOH fraction. The antioxidant enzyme activities of *Dioscorea japonica* were significant differences according to different plant pigments.

**Table 1. SOD activities of cosmetic composition having the natural plant pigment and various partition extracts in *Dioscorea japonica***

Cosmetic composition	SOD activity (inhibition rate %)			
	Pigment composition	Pigment composition +	Pigment composition +	Pigment composition +
		EtOH extract	BuOH extract	EtOAc extract
Black rice	23.3±0.23	32.4±0.17	26.1±2.41	41.9±0.40
Purple sweet potato	33.7±0.88	41.5±0.48	36.3±2.15	44.0±2.04
Mature bitter melon	26.8±3.09	34.0±1.99	27.6±2.80	39.7±0.65
Paprika	29.3±0.26	40.3±1.08	33.1±0.20	42.7±0.88
Red cabbage	35.8±2.34	31.4±2.67	28.0±0.85	42.5±0.54
Yellow gardenia	16.9±1.37	27.2±2.95	22.1±1.33	38.0±1.81
Blue gardenia	19.3±0.14	23.1±0.43	27.4±1.02	35.2±1.47
Chinese foxglove	65.5±1.62	67.3±1.30	58.4±0.71	72.8±2.26
Mulberry leaves	67.1±1.36	58.7±1.13	49.5±1.33	66.3±1.10
Onion peel	15.3±1.02	16.6±1.93	23.6±0.99	31.6±0.54
Grape peel	38.9±0.88	34.4±1.05	26.9±0.23	43.8±0.34
Mulberry	30.5±3.73	30.4±0.65	28.7±1.25	40.7±0.54
Red beet	26.9±1.88	51.3±0.11	47.4±1.59	55.4±0.26
gromwell	31.5±0.17	33.5±1.22	33.3±0.28	46.0±1.95
cactus	22.0±1.14	28.7±1.11	22.8±2.49	34.7±0.88

**Table 2. APX activities of cosmetic composition having the natural plant pigment and various partition extracts in *Dioscorea japonica***

Cosmetic composition	APX activity (μmol ascorbate oxidized/min/mg protein)			
	Pigment composition	Pigment composition +	Pigment composition +	Pigment composition +
		EtOH extract	BuOH extract	EtOAc extract
Black rice	554.7±45.79	845.2±51.96	2635.9±104.18	3233.0±81.82
Purple sweet potato	875.3±39.85	839.6±26.41	1560.6±132.17	2001.2±48.73
Mature bitter melon	863.6±65.53	782.1±61.30	2654.1±146.23	4635.7±94.75
Paprika	1191.6±68.23	1232.9±107.56	2468.9±87.73	5062.3±127.05
Red cabbage	1715.7±143.34	2433.1±55.36	1938.0±44.46	4375.3±189.09
Yellow gardenia	458.0±22.71	945.4±79.35	1125.2±145.38	1451.6±49.28
Blue gardenia	379.7±78.35	508.4±50.78	399.3±31.58	901.7±89.34
Chinese foxglove	1146.0±68.02	1299.4±37.36	2590.8±42.75	5161.2±107.29
Mulberry leaves	1287.3±62.87	279.2±52.14	1541.8±49.24	2052.3±106.94
Onion peel	714.6±86.08	2260.5±206.44	2824.4±170.20	3433.0±90.50
Grape peel	1662.8±125.33	1598.5±129.32	5266.4±122.70	5839.5±114.68
Mulberry	2183.5±105.66	1255.8±40.40	2209.4±85.52	3413.0±137.25
Red beet	1052.3±75.29	2344.4±157.37	3381.0±179.01	3654.6±181.50
Gromwell	1290.9±146.20	1992.2±57.38	1732.4±69.73	2565.1±131.51
Cactus	2633.3±143.48	2738.0±252.38	4819.9±136.74	6262.2±145.62

**Table 3. CAT activities of cosmetic composition having the natural plant pigment and various partition extracts in *Dioscorea japonica***

Cosmetic composition	CAT activity (μmol H <sub>2</sub> O <sub>2</sub> decomposed/min/mg protein)			
	Pigment composition	Pigment composition +	Pigment composition +	Pigment composition +
		EtOH extract	BuOH extract	EtOAc extract
Black rice	179.3±5.55	81.2±8.71	53.5±3.95	25.7±1.03
Purple sweet potato	152.3±11.24	76.9±2.74	33.7±2.32	31.8±1.77
Mature bitter melon	110.1±2.35	103.3±7.58	43.8±2.23	21.5±3.44
Paprika	133.4±6.13	121.2±3.44	33.0±2.93	29.4±1.10
Red cabbage	343.5±12.68	307.2±4.18	139.4±6.22	57.1±2.64
Yellow gardenia	86.3±5.15	98.7±5.40	35.9±3.54	23.1±2.53
Blue gardenia	35.5±3.61	32.2±0.33	12.4±1.78	12.5±1.29
Chinese foxglove	176.3±11.25	169.3±11.25	52.2±3.69	41.7±1.63
Mulberry leaves	207.3±8.27	87.1±4.37	61.1±2.09	53.9±2.29
Onion peel	250.2±6.38	213.7±12.90	118.3±4.53	50.2±5.26
Grape peel	234.4±12.36	260.6±5.36	62.0±9.63	43.0±3.48
Mulberry	314.7±14.10	315.1±8.15	128.6±13.36	62.0±1.40
Red beet	178.3±7.65	196.1±8.98	106.3±8.57	52.1±5.73
gromwell	109.6±5.32	96.3±10.33	33.7±5.96	47.7±2.60
cactus	478.9±5.98	336.1±31.03	134.0±9.02	67.3±5.82