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Physiological Characteristics of Medicinal Herbs Soysauce with Ripening Period

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약용작물을 이용한 간장의 숙성기간에 따른 품질학적 특성

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Objectives

Through the action of the various enzymes which microbes such as molds, bacteria and yeast secretes during processing, protein and other constituents of soybean are changed to various organic ingredients, amino acids, peptides, nitrogen, melanoidins, among others. These organic materials control the taste of the various cooking foods consequently, Soy sauce is the a major seasoning foodstuffs in Korea. This study was carried out to investigate the physiological characteristics of medicinal herbs soysauce (MHSS), after adding 24 kinds of medicinal herbs, with ripening period.

Materials

- Soybean (Glycine max L., a Korean cultivar 'Daewon', genetically unmodifeied)used in this study was harvested in 2000 from Buyeo, Chungcheongnam-do, Korea.
- 24 dried medicinal herbs (Angelica gigas *et al*).

Methods

Nitrogen compounds content: methods of the Korea Food and Drug Administration (2000).
Isoflavone content of MHSS : method of Coward *et al.* (1993).
Antioxidative activity : method of Blois (1958)
SOD-like activity : method of Marklund *et al.* (1974)
ACE inhibitory activity : method of Cushman *et al.* (1971)
NO radical scavenging activity : method of Gray *et al.* (1975)

Results

Total nitrogen compound content increased up to 5 years after which there were no significant differences the peptide-N content increased up to 5 years and decreased thereafter, while formol- and amino-type N content gradually increased up to 10 years. The major isoflavones of MHSS were daidzin, genistin and genistein, accounting for 128.7~130.7, 113.7~128.5 and 96.8~104.6 μg/g, respectively. After 10 years ripening of MHSS, free type of daidzin doubled while conjugated type of genistin decreased by 30%. When the ripening period was increased, DPPH radical

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scavenging and SOD-like activity, as well as ACE inhibitory ability and nitrite scavenging effects increased: the IC_{50} value of MHSS ripened for 10 years for DPPH radical scavenging activity was <0.1 mg, SOD-like activity was 82.5% at 5 mg/mL of MHSS, nitrite scavenging effect was 60.1% (pH 1.2) at 5 mg/mL of MHSS and the ACE inhibitory ability of 9-year-old ripened MHSS was highest, at 89.1 ± 1.5%.

Table 1. Changes of free and conjugated type isoflavones content (ug/g, drybasis) of MH soysauce during ripening period.

Sample	Ripening Periods (Years)	Daidzin		Daidzein		Genistin		Genistein		Total
		Free type	Conjugated type	Conjugated type	Conjugated type	Free type	Conjugated type	Free type	Conjugated type	
HB soysauce	1	86.2±1.3	44.2±0.8	14.5±1.5	17.7±0.7	76.2±2.6	52.3±1.7	23.2±0.9	73.6±1.5	387.9±9.2
	2	87.5±1.4	42.5±0.9	22.6±1.6	20.4±1.2	77.5±2.2	48.7±1.8	24.2±1.1	74.3±1.6	397.7±10.3
	3	87.6±0.9	43.4±0.8	23.4±1.4	22.6±1.1	77.6±2.4	46.0±1.4	25.0±1.2	76.5±1.6	402.1±8.7
	4	88.6±1.0	43.6±0.8	24.6±1.2	23.4±0.6	78.6±1.9	42.1±1.5	25.8±0.8	75.4±1.4	402.1±9.6
	5	87.3±0.8	42.5±0.7	26.5±1.3	24.2±0.7	77.3±2.0	38.5±1.9	26.1±0.9	74.6±1.2	397.0±8.4
	6	86.5±0.6	42.2±0.5	27.2±1.4	23.5±1.0	77.5±1.8	38.0±1.6	27.0±0.7	75.3±1.3	397.2±7.7
	7	87.4±0.5	43.0±0.7	27.8±1.2	24.6±0.9	77.4±1.7	39.0±1.4	27.4±0.8	77.2±0.8	403.8±8.0
	8	87.2±0.5	42.5±0.6	28.0±1.0	24.2±1.0	77.2±1.7	37.1±1.5	27.6±0.6	75.6±0.9	399.4±6.8
	9	88.0±0.4	42.7±0.7	28.2±1.0	25.0±0.7	77.0±1.8	37.5±1.7	27.8±0.7	75.2±0.6	401.4±7.1
	10	86.8±0.3	42.6±0.8	28.5±0.9	24.5±0.8	76.8±1.7	36.9±1.3	28.0±0.7	72.6±1.0	396.7±6.9
General soysauce	2	75.8±0.7	42.1±0.3	13.4±1.2	12.3±0.8	75.8±2.0	44.6±1.4	22.5±0.8	71.6±1.1	358.1±8.9

Table 2. DPPH radical scavenging activity of MH soysauce during ripening period .

Conc. (mg/mL)	MH soysauce(Ripening periods, years)										General soysauce	BHA
	1	2	3	4	5	6	7	8	9	10	2	
0.1	8.6±2.3	11.9±1.8	23.2±0.8	28.6±0.8	30.5±0.7	36.8±0.9	43.5±0.8	48.0±1.0	52.1±0.7	56.4±0.9	10.5±2.3	46.8±2.1
0.5	32.4±3.5	42.9±2.4	53.4±1.3	66.1±0.9	72.4±1.0	77.9±1.5	83.8±1.2	87.7±0.9	92.5±1.1	97.6±1.0	29.3±3.1	98.3±1.0
1	52.1±0.9	68.7±1.1	78.6±0.7	92.3±0.6	95.8±0.9	96.8±0.8	97.0±1.0	97.7±0.8	98.1±0.2	99.6±0.2	46.4±2.7	100±0.0
5	96.2±0.2	100.0±0.0	100.0±0.0	100.0±0.0	100.0±0.0	100.0±0.0	100.0±0.0	100.0±0.0	100.0±0.0	100.0±0.0	87.4±0.5	100±0.0

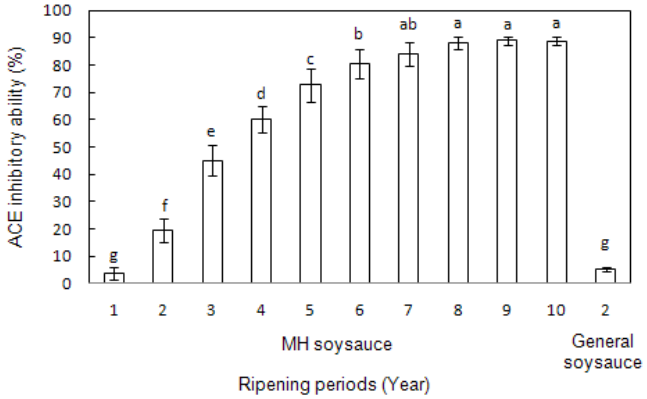

Fig. 1 ACE inhibitory ability of MH soysauce during ripening period.

Data are mean ± SD (n = 3). Values with the same superscript are not significantly different by Duncan's multiple range test at $P < 0.05$. MH soysauce was diluted 100-times.