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Sensory Characteristics of Dressing made with *gugija*(*Lycium chinense*)

Jung-Su Yang[1], Hyun-Ah Kim[2] and Chung-Rak Song[3¶]
[1]Dept. of Academy of Coexistence, CJ Foodville
[2]Dept. of Culinary Arts & Hotel Food Service, Major in Culinary Arts, Yeonsung University
[3¶]Dept. of Tourism Food Service Cuisine, Hallym Polytechnic University

ABSTRACT: Considering sensory characteristics Herbal mayonnaise, Herbal yoghurt and Herbal italia dressing with extracts of *gugija*(*Lycium chinense*) as additives, this study attempts to develop dressing that meets preference of people of Korea through sensory characteristics. The test results of moisture, pH, color, viscosity and sensory testing dressings with 10%, 15% and 20% extracts of *gugija*(*Lycium chinense*) as follow; Moisture contents increase in proportion to addition of the extracts of *gugija*(*Lycium chinense*). Sugar contents decrease in proportion to addition of the extracts of *gugija*(*Lycium chinense*). Also pH values of dressings increase with addition of *gugija*(*Lycium chinense*) extracts. Lower Hunter L values are observed from the dressings with the extracts of *gugija*(*Lycium chinense*) than control groups. Higher Hunter a values are observed from the dressing with *gugija*(*Lycium chinense*) extracts, whereas lower Hunter b values are observed from the dressings with *gugija*(*Lycium chinense*) extracts. The lower viscosity values are observed with addition of the extracts of *gugija*(*Lycium chinense*)*s* than control groups. For mayonnaise dressing, ML3 with 20% *gugija*(*Lycium chinense*) extract(MC1) mark highest overall preference. For yoghurt dressing, YL3 with 20% *gugija*(*Lycium chinense*) extract show highest overall preference. For Italian dressing, IL3 with 20% *gugija*(*Lycium chinense*) extract impart highest Overall preference. According to the results of this study, the dressings with the extracts of *gugija*(*Lycium chinense*) are preferred in color, flavor, taste and overall preference to control groups. This study might provide significant data for developing dressings with herbal medicine match with dishes to meet the needs for health of our contemporaries.

Keywords: *gugija*(*Lycium chinense*), herbal dressing, sensory characteristics, moisture, color, viscosity

INTRODUCTION

Recently, in development of a new menu that will satisfy consumers, addition of widely used oriental medicine ingredients that have pharmacological action to enhance the function of food products has been reported. Along with the increase in the sales of products that use the oriental medicine ingredient as the main ingredient, marked increase in the use of natural additives in replace of artificial preservatives is observed.

Researches around the use oriental medicine ingredients are *omija* sauce (Kim HD 2004, Yoo KM 2006), *nabak kimchi* (Kim MJ et al 2006), development of functional soy-based stew sauce (Oh HS and Kim JH 2006), rice cake (Lee MY 2005), Korean tradi-

¶ Corresponding Author: Chung-Rak Song, Dept. of Tourism Food Service Cuisine, Hallym Polytechnic University, 48 Janghak-gil, Dong-meon, Chuncheon 200-711, Korea, Tel. +82-33-240-9115, Fax. +82-33-240-9119, E-mail: happysong21c@hanmail.net

tional wine (Lee DH et al 2005. Song JH et al 2011), cake(Kim YA 2005), cookies(Park SY 2004), white bread(Shin JW 2004), paste(Kim DH 2003), noodles(Lim YS 2002), development of Korean traditional tea(Joo HK 1988) etc. that the researched are carried out in various areas.

Among the favorite food products consumed in Korea, traditional seasoning products such as soy sauce, soybean paste, chilli paste and the western sauces like hot sauce, tomato ketchup, mayonnaise and dressings are the widely used seasoning products. Contemporaries now tend to put more importance in the health related food's third function that while dressings are made with fruits or ingredients with less fat, no dressing products have been produced with the Korean medicine ingredient which is a traditional food ingredient of Korea. Therefore, at the present when contemporaries' interest in food that uses Korean medicine ingredients is heightening and there is a need to find a new way to reserve and maintain Korean traditional medicine ingredients from the Chinese imports(Kwon KD et al 2007), it is believed to be worthwhile to develop a dressing adding Korean traditional medicine ingredient.

Dressing is a sauce kind of seasoning that is added to food in order to enhance the flavor in the process of producing, processing, and cooking. Its main ingredients are cooking oil, vinegar with addition of culinary salt, sugar, spices, poultry eggs and it is either emulsified or produced as separated liquid and added with vegetable oil or fruits. It is referred to as mayonnaise, emulsified dressing, separated liquid dressing, salad dressing and French dressing(Korea Foods Industry Association 2000).

The three types of dressing are dressing mixed with oil and vinegar, dressing with mayonnaise, and the cooked dressing. The flavor and property depends on the quality of the ingredients used. Ingredients used for dressing are oil, acid, and other supplementary ingredients to aid the flavor and emulsification(Gisslen 1995); the oil used are usually refined vegetable oil and the acids are from fruits, either vinegar or lemon.

Often as a mean to increase the use and consumption of uncooked vegetables, when consumed with salad dressing enhances flavor and scent and has an effect of maintaining the body fluid as alkaline(Kim MH 2003), and especially it increases the consumption of uncooked raw vegetables that aids in preventing the recent concerns such as obesity and adult diseases. Therefore, as an alternative for vinegar and sugar used to make dressing, this research chose *gugija*(*Lycium chinense*) among the oriental medicine ingredients used in previous researches for its sweetness and bone strengthening properties (Natural Products Research Institute, Seoul National University 2003). *Gugija*(*Lycium chinense*) has appeared in various researches - effect of the physicochemical properties of nabak kimchi during fermentation (Kim MJ et al 2006), preservation of *seolgiddeok* and *jeolpyeon* (Lee MY 2005), quality characteristics of *injeulmi* (Lee HJ 2004), oxidative stability and quality characteristics of cookies (Park SY 2004), quality characteristics of wet noodle (Lim YS 2002), and research on extraction characteristics and antioxidative activity of *Lycium chinense* extracts (Kim HK et al 2004) - but has scarcely been researched when it is added to dressings.

Therefore, by adding *gugija*(*Lycium chinense*) extract to widely used dressings - mayonnaise dressing, yogurt dressing, Italian dressing - the research will observe moisture level, sweetness, pH, color value, viscosity, etc. and examine sensory characteristics to aid in developing a dressing product added with oriental medicine ingredients that meets the tastes of Korean people, satisfies the contemporaries' desire for health and prevents various adult diseases and obesity, and invigorate the distribution of Korean traditional medicine ingredients.

EXPERIMENTAL MATERIAL AND METHODS

Experimental Material

Dried *gugija*(*Lycium chinense*) was bought at Kyeongdong market, produced in the year 2014 at the region of Cheongyang. Plain yogurt(Denmark), honey(Dongseo), mayonnaise(Ottugi), lemon(USA), grapeseed oil(CJ), oligosaccharide(CJ), salt(Haepyo), black pepper(Ottugi) were bought at C mart.

Sample Production

Dried *gugija*(*Lycium chinense*) was washed in running water, then to make extracts, the dried *gugi-*

ja(*Lycium chinense*) and distilled water in 1:1 ratio was put into medicinal boiling pot of 80℃ degrees and was extracted for two hours; the extracts were kept in a fridge at 4℃ and was used as sample.

Based on the studies of Choi SK(1997), Choi SK and Choi HS (2005), Choi SK and Lee EJ(2007), after the preparatory experiment, 10%, 15%, 20% of *gugija*(*Lycium chinense*) extract was added to the dressings and the sauce at drippy state. Mayonnaise dressing was produced by weighing the mayonnaise, honey, oligosaccharide, salt, *gugija*(*Lycium chinense*) extract on an electronic scale(Dial-O-Orab Ballance 310 g, OHAUS, USA) and then were blended for 20 seconds by a blender(Philips, USA), and was kept in a refrigerator at 4℃ in a sealed glass container to be used when it is cold. Yogurt dressing and Italian dressing were also added with *gugija*(*Lycium chinense*) extract in the same ratio and attained the mixture ratio as in Table 1. Although Italian dressing usually is made with olive oil, the preparatory experiment result proved it is unsuitable and grapeseed oil was used instead. Yogurt dressing and Italian dressing were made with the same procedure as the mayonnaise dressing and all the dressings used were made right before the experiment.

Experimental Methods

1) Measuring Moisture Level

Moisture measurement of dressings added with *gugija*(*Lycium chinense*) extract was carried out by measuring the 5 g of samples on the moisture analyser(Moisture Analayser, MB45 OHAUS, USA) in halogen-type, each sample measured for five times and averaged.

2) Measuring Sugar Content

After thoroughly mixing the produced dressing, sugar content was measured using a refractometer(pal-1, ATAGO, Japan), each sample measured

Table 1. Formula of dressings made with *gugija*(*Lycium chinense*)

Sample	*LC extract (g)	Mayo-nnaise (g)	Yoghurt (g)	Grape seed oil (g)	Lemon (g)	Honey (g)	Oligosa-ccharide (g)	Salt (g)	Pepper (g)	Total (g)
Con		100			7	4	5	1		117
ML1	10	90			7	4	5	1		117
ML2	15	85			7	4	5	1		117
ML3	20	80			7	4	5	1		117
Con			100		14	7		1	0.5	122.5
YL1	10		90		14	7		1	0.5	122.5
YL2	15		85		14	7		1	0.5	122.5
YL3	20		80		14	7		1	0.5	122.5
Con				100		18		2		120
IL1	10			90		18		2		120
IL2	15			85		18		2		120
IL	20			80		18		2		120

* LC : *gugija (Lycium chinense)* extracts.
ML1 : Mayonnaise dressing made with *gugija(Lycium chinense)* 10%.
ML2 : Mayonnaise dressing made with *gugija(Lycium chinense)* 15%.
ML3 : Mayonnaise dressing made with *gugija(Lycium chinense)* 20%.
YL1 : Yoghurt dressing made with *gugija(Lycium chinense)* 10%.
YL2 : Yoghurt dressing made with *gugija(Lycium chinense)* 15%.
YL3 : Yoghurt dressing made with *gugija(Lycium chinense)* 20%.
IL1 : Italian dressing made with *gugija(Lycium chinense)* 10%.
IL2 : Italian d dressing made with *gugija(Lycium chinense)* 15%.
IL3 : Italian d dressing made with *gugija(Lycium chinense)* 20%.

more than five times and averaged.

3) pH Measurement

After thoroughly mixing the produced dressing, pH was measured using a pH meter(S50, METTLER TOLED, Korea); each sample was measured more than five times and was averaged.

4) Measuring Color Values

The color value of dressings added with oriental medicine ingredients were measured using color-difference meter(Color meter, JC-801, Color Techno Co, Japan), under the condition of samples contained in a cylindrical container on a 25mm, standard white board (L=94.23 a=−1.41, b=1.72); each sample was measured five times and was expressed in average.

5) Viscosity Measurement

500 mL of dressing was checkweighed in a 1,000 mL beaker; the viscosity was measured using a viscometer(Brookfield digital viscometer, LVD-Ⅱ+, Brookfield engineering laboratories Inc. U.S.A) at the temperature condition of 18±2℃, using Spindle SC63 at rotation velocity of 80 rpm. It was measured every 2 seconds for ten times and its average value was counted as one measurement. Each sample was measured five times.

6) Sensory Evaluation Test

Character difference test and preference test of dressing added with *gugija*(*Lycium chinense*) was conducted between 3 pm and 4 pm. With the water provided, participants were made sure to gargle their mouth after the test of each sample(average age of the participants: 23, no. of males: 24, no. of females: 21). Using table of random sample numbers, the samples were marked in a 3-digit random number and 50 mL of dressing with *gugija*(*Lycium chinense*) extract were provided in a white disposable plate made of polyethylene. The kitchen and the room for testing were separated. Categories of character difference test were appearance, glossiness, sweet taste, sour taste, herbal taste, thickness, and the categories of preference test were color, flavor, taste, viscosity, and overall preference which was measured in 15-point linear scale which the participants gave higher points for stronger character and the preference.

7) Statistical Methods

All experiments were repeated more than five times and the results were analyzed in one-way ANOVA with the significance test carried out at $p<0.05$ through Duncan's multiple test. SPSS WIN program 18.0 was used for statistical analysis.

RESULTS AND DISCUSSION

Results of Measuring Moisture Level of Dressing Added with Oriental Medicine Ingredients

The moisture level of mayonnaise, a main ingredient for dressing, was 28.0%, the plain yogurt dressing 73.2%, Italian dressing 0.66%, and the *gugija*(*Lycium chinense*) extract contained 37.74% of moisture.

The result of measuring moisture level of mayonnaise, yogurt, and graped seed dressing each added with *gugija*(*Lycium chinense*) extract is as shown in Table 2 and showed a significant difference($p<0.001$). The moisture level of control group was 28%, and the ML1 with 10% of *gugija*(*Lycium chinense*) extract contained 45.69%, ML2 added with 15% contained 54.33%, ML3 contained 61.34% that as the amount of added *gugija*(*Lycium chinense*) extract increased, the moisture level significantly increased. The moisture level of yogurt dressing also showed significant difference($p<0.001$); when 10%, 15%, and 20% *gugija*(*Lycium chinense*) extract was added, the moisture level was 77.49%, 80.20%, 82.18% respectively, and the measurement of Italian dressing showed that when added with extract the result was 30.48～50.01%, showing that as the amount of *gugija*(*Lycium chinense*) extract added was increased the moisture level also increased and each sample showed a significant difference($p<0.001$). In the case of Italian dressing, compared to mayonnaise or yogurt dressing, there was a noticeable difference between the moisture level of control group and the dressing added with *gugija*(*Lycium chinense*) extract. While the grapeseed oil itself does not have moisture, the great difference in moisture level is believed to be due to the addition of moisture through supplementary ingredients such as honey and *gugija*(*Ly-*

Table 2. Moisture contents of dressings made with *gugija*(*Lycium chinense*)(%)

CON	ML1	ML2	ML3	*F*-value
28.0±0.63[d]	45.69±0.59[c]	54.33±0.35[b]	61.34±0.9[a]	2,800.93***
CON	YL1	YL2	YL3	*F*-value
73.25±1.73[d]	77.49±0.27[c]	80.20±0.16[b]	82.18±0.2[a]	57.34***
CON	IL1	IL2	IL3	*F*-value
0.66±0.15[c]	30.48±0.76[b]	48.08±2.32[a]	50.01±1.70[a]	702.99***

Mean±S.D., *** $p<0.001$.
[a~d] Mean Duncan's multiple range test for dressings made with *gugija*(*Lycium chinense*).
* Refer to Table 1 for legends.

Table 3. Sugar contents of dressings made with *gugija*(*Lycium chinense*)(°Brix)

CON	ML1	ML2	ML3	*F*-value
30.20±0.6[a]	22.92±0.35[b]	17.98±2.95[c]	15.82±0.47[d]	1,029.48***
CON	YL1	YL2	YL3	*F*-value
21.30±0.12[a]	20.44±0.55[b]	18.60±0.00[c]	16.34±0.00[d]	4,507.97***
CON	IL1	IL2	IL3	*F*-value
47.56±0.29[a]	43.74±0.71[b]	41.92±1.3[c]	40.48±0.23[d]	93,467.79***

Mean±S.D., *** $p<0.001$.
[a~d] Mean Duncan's multiple range test for dressings made with *gugija*(*Lycium chinense*).
* Refer to Table 1 for legends.

cium chinense) extract during production.

The increase in amount of *gugija*(*Lycium chinense*) extract added led to increased moisture level; the suggested moisture level of mayonnaise according to the standard tables of food composition from Koreans' recommended dietary allowance is 23.7% that the addition of oriental medicine extract as in this research can increase the moisture level of mayonnaise dressing which will help decrease the calorie. The research of Lee MY(2005) showed a different tendency compared to this research; as the amount of *gugija*(*Lycium chinense*) extract added increased, the moisture level of wet noodles decreased. Despite the high moisture level of *gugija*(*Lycium chinense*), the result can be varied depending on the moisture level of main ingredient.

Results of Measuring Sugar Content

Result of measuring sugar content of dressing added with oriental medicine ingredient extract is as shown in Table 3; the result of measuring sugar content of mayonnaise with *gugija*(*Lycium chinense*) extract showed significant($p<0.001$) difference. The sugar content of control group was 30.20 °Brix, the ML1 with 10% *gugija*(*Lycium chinense*) extract showed 22.92 °Brix, ML2 with 15% showed 17.98 °Brix, ML3 with 20% showed 15.82 °Brix that as the amount of *gugija*(*Lycium chinense*) extract added increased that sugar content of dressing decreased. Plain yogurt dressing also showed significant difference($p<0.001$); the control group containted 21.30 °Brix, YL1 with the *gugija*(*Lycium chinense*) extract showed 20.44 °Brix, YL2 18.60 °Brix, YL3 16.34 °Brix that as the amount of *gugija*(*Lycium chinense*) extract added increased, the sugar content decreased. Sugar content of Italian dressing also showed significant($p<0.001$) difference; samples added with *gugija*(*Lycium chinense*) extract showed between 43.74

~40.48 °Brix that as the amount of the extract added increased, the sugar content decreased. Italian dressing showed relatively high level of sugar content measured compared to mayonnaise dressing and yogurt dressing and we believe it is the content of honey is higher compared to other dressings.

Result of Measuring pH

Result of measuring pH of *gugija*(*Lycium chinense*) extract showed pH of 4.13 and the results of adding the extract to mayonnaise, yogurt and Italian dressing are as shown in Table 4.

The ph of the control group of the mayonnaise dressing added with *gugija*(*Lycium chinense*) extract was 2.44, and ML1(10% of *gugija* extract) showed 2.51, ML2 2.98, ML3 3.06 that as the amount of extract added increased the pH value increased. This coincides with the research of Yoo KM et al (2004) that the addition of *yuza(Citrus junos)* juice to the sauce increases the pH and this is thought to be due to the high level of pH in *yuza* juice or *gugija*. The pH of yogurt dressing when added with 10%, 15%, 20% of *gugija* extract showed 3.11, 3.18, and 3.27 respectively that as the amount of *gugija* extract increased the pH value increased respectively. Just as mayonnaise and yogurt dressing, the pH of Italian dressing added with *gugija* extract showed 3.94 for GL1, 3.95 for GL2, and 4.03 for GL3 that as the amount of extract increased the pH increased. As the amount of *gugija* extract added increased the pH value of dressing increased significantly and this is a tendency that coincides with the research of Kim MJ(2006) that as the amount of *gugija* extract increased the pH of nabak kimchi increased.

Results of Measuring Color Value

Results of measuring lightness(L-value) of mayonnaise, yogurt, and Italian dressing added with *gugija*(*Lycium chinense*) extract is as shown in Table 5. Lightness of mayonnaise dressing was 81.16 which is the highest and the dressing added with *gugija* extract was between 75.36~68.99 that as the amount added increased the lightness decreased significantly(p<0.001). The lightness of yogurt dressing was 83.82 for the control group, 70.42 for YL1, 62.9 for YL3, 72.68 for YC1, and 69.40 for YC3 that just like the mayonnaise dressing, the brightness decreased when the amount of extract added increased. As for Italian dressing, the control group showed 49.27, IL1 39.25, IL3 36.13 that as the amount of *gugija* extract increased the lightness decreased. The groups that were added with *gugija* extract showed darker color with lower lightness measured and this is thought be the effect of the dark reddish brown color of *gugija* extract that causes the darkening as the amount added increased. This is a tendency that coincides with the research of Lee MY(2005) that as the amount of *gugija* extract increased the brightness of *seolgiddeok* decreased.

Results of measuring redness(a-value) of mayonnaise, yogurt, and Italian dressing added with *gugija*(*Lycium chinense*) extract is as shown in Table 6. The a-value of mayonnaise dressing showed significant(p<0.001) difference; the control group showed 1.17 which was the lowest, and the ML1 that had *gugija* extract added was 3.7, ML2 5.46, and ML3

Table 4. The pH values of dressings made with *gugija*(*Lycium chinense*)

CON	ML1	ML2	ML3	*F*-value
2.44±0.0^{d}	2.51±0.0^{c}	2.98±0.0^{b}	3.06±0.0a	14,506.73***
CON	YL1	YL2	YL3	*F*-value
3.00±0.0^{d}	3.11±0.1^{c}	3.18±0.0^{b}	3.27±0.0^{a}	1,093.234***
CON	IL1	IL2	IL3	*F*-value
2.76±0.0^{c}	3.94±0.0^{b}	3.95±0.0^{b}	4.03±0.02^{a}	18,488.774***

Mean±S.D., *** p<0.001.

$^{a\sim d}$ Mean Duncan's multiple range test for dressings made with *gugija*(*Lycium chinense*).

* Refer to Table 1 for legends.

Table 5. The Hunter L values of dressings made with *gugija*(*Lycium chinense)*

CON	ML1	ML2	ML3	*F*-value
81.16±0.50[a]	75.36±0.88[b]	71.92±0.44[c]	68.99±0.29[d]	296.29***
CON	YL1	YL2	YL3	*F*-value
83.82±0.48[a]	70.42±0.18[b]	63.29±0.29[c]	62.90±0.14[c]	4734.9***
CON	IL1	IL2	IL3	*F*-value
49.27±1.64[a]	39.25±1.4[b]	38.42±1.71[b]	36.13±1.35[c]	49.65***

Mean±S.D., *** $p<0.001$.

[a-d] Mean Duncan's multiple range test for dressings made with *gugija*(*Lycium chinense*).

* Refer to Table 1 for legends.

7.05 that as the amount of *gugija* extract added increased the a-value also increased. The a-value of yogurt dressing also showed −2.99 for control group, 2.61 for YL1, 5.98 for YL3 that just like the mayonnaise dressing the increase of *gugija* extract led to the increase in a-value. As for Italian dressing, the a-value of control group was −1.31, −0.36 for IL1, 1.6 for IL3 that the dressing did not exhibit significant difference. The dressings added with *gugija* extract showed generally higher a-value(redness) and as with the results of lightness test, this is believed to be the result from the original color of the *gugija*. It is a result that concurs with the research of Kwak EJ, et al(2002) that generally a higher a-value is exhibited when the *omija* extract is increased due to the ingredient's original redness and also with the research of Lee MY(2005) as more *gugija* extract was added the a-value of *seolgiddeok* increased.

Results of measuring yellowness(b-value) of mayonnaise, yogurt, and Italian dressing added with *gugija*(*Lycium chinense*) extract is as shown in Table 7.

The the lowest b-value of mayonnaise dressing, 21.76, was of the control group, and the ML with *gugija*(*Lycium chinense*) extract was 27.17, ML2 33.11, ML3 37.38 that the b-value gradually increased as the extract added increased and this differs with the research of Zao Zhin, et al(2005) that the increased amount of spirurina added leads to lowering of the b-value. The b-value of yogurt dressing was 8.47 for the control group, and the YL1 with *gugija*(*Lycium chinense*) was 24.44 and YL3 30.27 that significant difference was exhibited($p<0.001$) and the b-value of Italian dressing showed significant difference ($p<0.001$) of its control group showing −23.94, IL1 showing 22.33, and IL3 showing 30.31 that as the *gugija*(*Lycium chinense*) extract added increased the b-value increased, too. The dressings with *gugi-*

Table 6. The Hunter a values of dressings made with *gugija*(*Lycium chinense*)

CON	ML1	ML2	ML3	*F*-value
1.17±0.27[d]	3.7±0.47[c]	5.46±0.15[b]	7.05±0.22[a]	223.77 ***
CON	YL1	YL2	YL3	*F*-value
−2.99±0.2[c]	2.61±0.42[b]	5.89±0.28[a]	5.98±0.28[a]	654.09 ***
CON	IL1	IL2	IL3	*F*-value
−1.31±3.61	−0.36±1.1	2.12±5.33	1.6±1.5	0.924[NS]

Mean±S.D., *** $p<0.001$.

[a~d] Mean Duncan's multiple range test for dressings made with *gugija*(*Lycium chinense*).

* Refer to Table 1 for legends.

Table 7. The Hunter b values of dressings made with *gugija*(*Lycium chinense*)

CON	ML1	ML2	ML3	*F*-value
21.76±0.71[d]	27.17±2.07[c]	33.11±0.73[b]	37.38±0.61[a]	101.05***
CON	YL1	YL2	YL3	*F*-value
8.47±0.22[c]	24.44±0.24[b]	29.89±0.59[a]	30.27±0.15[a]	293.25***
CON	IL1	IL2	IL3	*F*-value
−23.94±4.94[b]	22.33±3.61[a]	19.38±17.45[a]	30.31±1.48[a]	18.62***

Mean±S.D., *** $p<0.001$.

[a~d] Mean Duncan's multiple range test for dressings made with *gugija*(*Lycium chinense*).

* Refer to Table 1 for legends.

ja(*Lycium chinense*) extract showed higher yellowness(b-value) and this is thought to be effect of original color of *gugija* and it is an opposite tendency of Lee MY(2005)'s research that as the *gugija* powder added increased the b-value(yellowness) of *seolgiddeok* decreased.

Results of Measuring Viscosity

Results of measuring viscosity of mayonnaise, yogurt, and Italian dressing added with *gugija*(*Lycium chinense*) extract is as shown in Table 8. Each of the samples showed significant difference($p<0.001$).

The control group's viscosity of mayonnaise dressing was 1129.39 cP which was the highest, and the ML1 with *gugija*(*Lycium chinense*) extract was 839.21 cP, ML2 336.39 cP, and ML3 153.24 cP that as the amount of extract increased the viscosity of the dressing decreased. This is a tendency that falls together with the results of Zao Zhin, et al(2005) that as the amount of spirulina increased the viscosity decreased. The viscosity of yogurt dressing exhibited by the control group was 596.64 cP, YL1 213.13 cP, YL3 136.15 cP that as the amount of extract added increased to viscosity decreased. The viscosity of Italian dressing exhibited by the control group was 272.72 cP, IL1 130.29 cP, IL3 21.56 cP that just as the mayonnaise dressing and yogurt dressing the increased addition of oriental medicine ingredient led to decreased viscosity.

The viscosity of the *gugija*(*Lycium chinense*) extract is low as 32.82 cP that when added to the dressings its viscosity becomes lower than the control group.

Results of Sensory Test

Results of character difference test for mayonnaise, yogurt, and Italian dressing added with *gugija*(*Lycium chinense*) extract is as shown in Figure 1.

The mayonnaise dressing added with *gugija* ex-

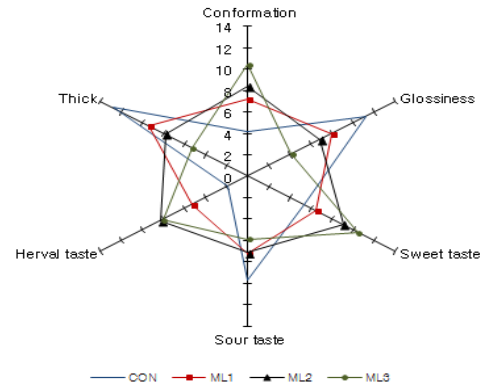
Table 8. Viscosity values of dressings made with *gugija*(*Lycium chinense*)(cP)

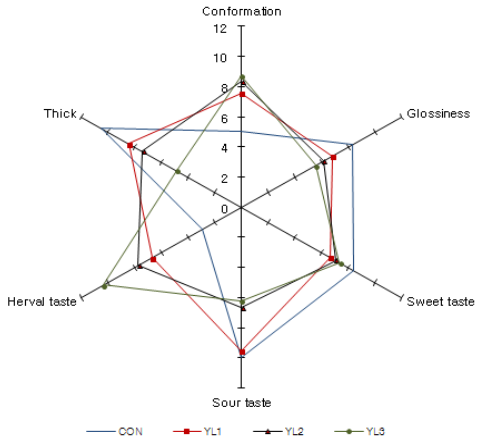
CON	ML1	ML2	ML3	*F*-value
1,129.39±13.76[a]	839.21±3.35[b]	336.39±1.54[c]	159.24±0.58[c]	562.05***
CON	YL1	YL2	YL3	*F*-value
596.64±4.22[a]	213.13±1.7[b]	193.37±2.31[c]	136.15±19.84[d]	376.483***
CON	IL1	IL2	IL3	*F*-value
272.73±0.09[a]	130.29±5.68[b]	53.63±1.44[c]	21.56±0.46[d]	909.28***

Mean±S.D., *** $p<0.001$.

[a~d] Mean Duncan's multiple range test for dressings made with *gugija*(*Lycium chinense*).

* Refer to Table 1 for legends.





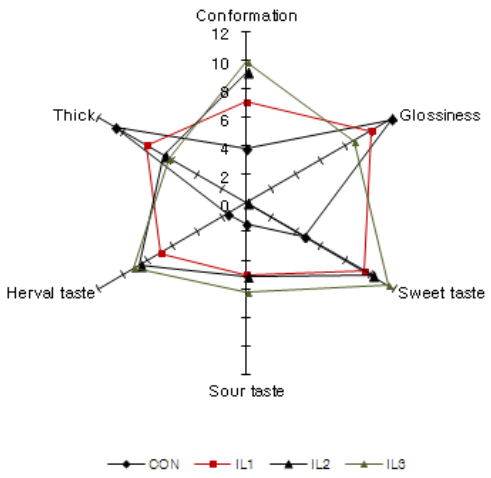


Figure 1. QDA results of dressings made with *gugija* (*Lycium chinense*)
* Refer to Table 1 for legends.

tract showed significant different terms of appearance(p<0.01), glossiness(p<0.05), sweetness(p<0.05), sourness(p<0.001), herbal taste(p<0.01), thickness(p<0.01) and as the amount of extract added increased that appearance, sweetness, and the herbal taste became stronger and the glossiness, sourness, and thickness became less apparent. The yogurt dressing with 10%, 15%, 20% of *gugija* extract showed significant difference in terms of appearance(p<0.01), glossines(p<0.05), sweetness(p<0.001), sourness(p<0.01), herbal taste(p<0.01), thickness(p<0.001) and as the amount added increased the appearance, sweetness, the herbal taste became stronger while the glossiness, sourness, and thickness weakened. Italian dressing showed significant differences in appearance(p<0.01), glossiness(p<0.05), sweetness(p<0.01), sourness(p<0.01), herbal taste(p<0.01), and thickness (p<0.01). Also as the amount of the extract added increased the appearance, sweetness, sourness, herbal taste became stronger while glossiness and thickness became less apparent.

As the amount of *gugija*(*Lycium chinense*) extract added increased the impression of the appearance became stronger and the thickness became less stronger that the result is same with the viscosity test where the viscosity decreased as the extract added increased. Also the herbal taste became stronger as the amount of *gugija* extract increased. This was a tendency that coincides with the results of Lim YS (2002) that the addition of *Lycii fructus* power led to higher preference for the appearance and taste. The increase in its amount also led to increased sweetness.

Results of preference test for mayonnaise, yogurt, and Italian dressing added with *gugija*(*Lycium chinense*) extract is as shown in Figure 2; each of the samples showed significant difference.

The result of preference test for mayonnaise dressing with extract added showed significant difference in color(p<0.01), taste(p<0.05), viscosity(p<0.05), overall preference(p<0.01) and as the amount of extract added increased the preference for color, scent, taste, and overall preference that ML3 with 20% of *gugija* extract was the most preferred; regarding the viscosity, the increase in amount of extract led to decrease in viscosity that the mayonnaise dressing ML3 with 20% of extract was the most preferred. Result of preference test for yogurt dressing showed sigificant difference in color(p<0.05), scent (p<

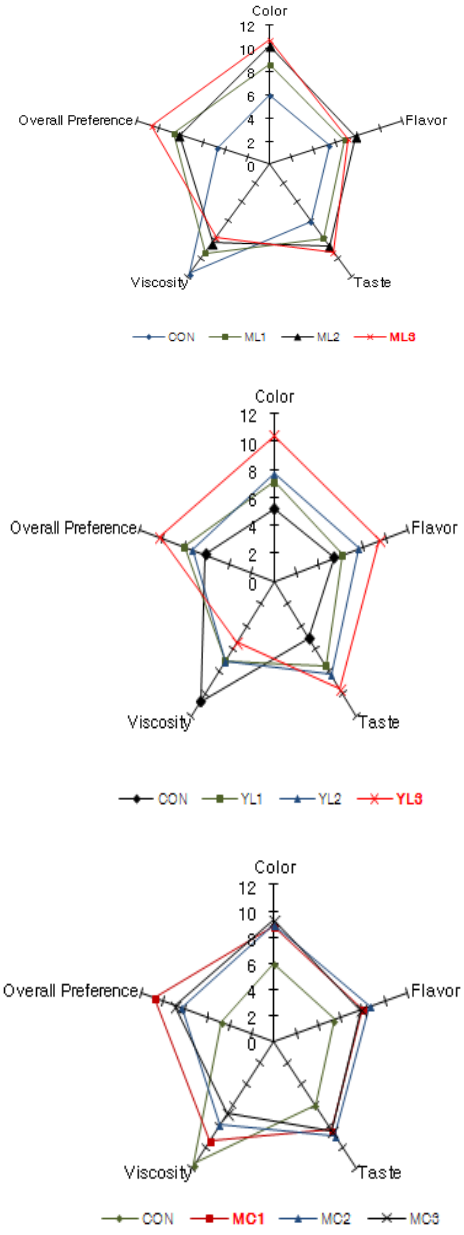


Figure 2. The overall preference of dressings made with *gugija*(*Lycium chinense*) in QDA.
* Legends are refer in Table 1.

0.01), taste(p<0.001), viscosity(p<0.001), overall preference(p<0.01) and as the amount of *gugija* extract added increased the preference for color, scent, taste, and overall preference increased that YL3 with 20% of *gugija* extract was the most preferred. As for Italian dressing, the significant differences were shown in color(p<0.01), scent(p<0.01), taste(p<0.001), viscosity(p<0.01), overall preference (p<0.01) and as the amount of *gugija* extract increased the color, scent, taste, and overall preference gradually increased. The GL3 with 20% of *gugija* extract was the most preferred and as for viscosity the increase of amount led to its decrease that GL3 with 20% of extract was the most preferred.

In general the preference for color and scent was increased as the amount of extract added was increased and this coincides with the results of Kang BS et al (2012) research that as the *sansuyu(Corni fructus)* extracts increased the color of yogurt turned intense. Regarding the viscosity, as the amount of extract added increased the viscosity lowered and as for the taste, when added with *gugija* extract, the increase in the extract led to higher preference and also with the overall preference that dressing with *gugija* extract was more preferred by the dressing without it. The results coincide with the research of Lim YS(2002) that the wet noodles added with *gugija* powder was more preferred than the raw noodles without the powder.

Therefore based on the results of testing character difference and preference of mayonnaise dressing, yogurt dressing, and Italian dressing added with *gugija*(*Lycium chinense*) extract, ML3 for the mayonnaise dressing that had 20% of *gugija extract,* YL3 for the yogurt dressing that had 20% of *gugija* extract, and GL3 for the Italian dressing that also had 20% of *gugija* extract was the most preferred in overall which tell it is the proper amount to be added to the dressings. Therefore, it is concluded that adding oriental medicine ingredient extracts to dressings can meet the tastes of consumers and there should be researches on oriental medicine extracts added while maintaining the viscosity of the sauce.

SUMMARY AND CONCLUSION

This research intended to develop a dressing that will meet the tastes of Korean people by measuring moisture content, pH, color value, viscosity and the sensory traits of the three most consumed dressings at home or in the industry - mayonnaise dressing, yogurt dressing, Italian dressing - added with *gugija*(*Lycium chinense*) extract.

1. Moisture content in ayonnaise dressing, yogurt dressing, Italian dressing made with *gugija* (*Lycium chinense*) extract showed increase as the amount of extract added was increased.
2. As the amount of *gugija*(*Lycium chinense*) extract added increased the sweetness gradually decreased significantly; the pH increased as the amount of *gugija* extract increased.
3. Regarding the color values, the dressings with *gugija*(*Lycium chinense*) extract showed lower brightness and darker color compared to the sample group; a-value(redness) and b-value (yellowness) was higher in the dressing with *gugija* extract than the sample group.
4. Viscosity in mayonnaise dressing, yogurt dressing, Italian dressing made with *gugija*(*Lycium chinense*) extract decreased significantly as the amount of the extract added was increased.
5. Results of trait difference and preference tests of dressing added with *gugija*(*Lycium chinense*) extract showed that as the amount of extract added increased, the color, scent, taste, and overall preference were positively evaluated that adding traditional medicine ingredient extracts can still meet the tastes of consumers.

This research examined the dressing added with *gugija*(*Lycium chinense*) extract in terms of technical, sensory traits in order to find out the optimal amount of concentration and the results showed that compared to the control groups, the dressings added with *gugija* extract was preferred in terms of color, scent, taste and overall preference that confirmed its superiority in techical and sensory terms and the possibility of developing functional dressing added with *gugija* extract. It also leads to the possibility of developing a dressing that aids health by using oriental medicine ingredients as alternatives for artificial flavors such as vinegar or sugar.

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구기자를 첨가한 드레싱의 관능적 특성

양정수[1] · 김현아[2] · 송청락[3]¶

[1]CJ Foodville, [2]연성대학교 호텔조리과, [3]¶한림성심대학교 관광외식조리과

국문초록

본 연구는 구기자 추출물을 첨가하여 한국 사람의 기호에 부합하는 마요네즈, 요거트, 이탈리아 드레싱을 개발하고자 한다. 구기자 추출물 10%, 15% 그리고 20%를 첨가하여 드레싱을 만들고 드레싱의 수분 함량, pH, 색, 점도, 관능평가를 실시한 결과는 다음과 같다. 수분 함량은 구기자 추출물의 첨가량이 증가할수록 증가하였고, 당도는 감소하였다. 또한 드레싱의 pH는 구기자 추출물의 첨가량이 증가할수록 높아졌다. 구기자 추출물의 첨가량이 증가할수록 드레싱의 명도는 대조군보다 낮아졌고, 적색도와 황색도는 높아졌다. 드레싱의 점도는 대조군에 비해 구기자 추출물의 첨가량이 증가할수록 낮아졌다. 마요네즈 드레싱은 구기자 추출물이 20% 첨가된MC3가 전반적인 기호도가 가장 높았고, 요거트 드레싱도 구기자 추출물이 20% 첨가된 YL3가 가장 선호되었다. 이탈리아 드레싱도 구기자 추출물이 20% 첨가된 GL3가 가장 선호되는 것으로 나타났다.

따라서 본 연구 결과 드레싱에 구기자 추출물을 첨가할 경우 드레싱의 색, 향, 맛, 전반적인 기호도에서 구기자 추출물을 첨가하지 않은 대조군 보다 선호됨을 알 수 있었고 한약재가 첨가된 건강한 드레싱의 개발이 가능하리라 생각된다.

주제어: 드레싱, 구기자, 관능평가, 수분함량, 점성