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Physicochemical and Formulation of Nutrilicious Green Spread

[1]Sabaianah Bachok, [1]H. Rasidah, [2]Nur Asyikin A.N, [3]Nur Liyana Mohd Sahiffudin, [3]Suriati Tajrud-din, [3]Rasidi Hazman Abdul Hamid

[1]*Faculty of Hotel and Tourism Management, Universiti Teknologi MARA (UiTM), Shah Alam, 40450 Selangor Malaysia*
[2]Centre of Foundation Studies, UiTM Puncak Alam
[3] *Department of Tourism and Hospitality, Politeknik Muadzam Shah, Lebuhraya Tun Abdul Razak 26700 Muadzam Shah*

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ABSTRACT

It is the blend of the three main ingredients of green apples, cucumbers and "celery". all materials used have their own nutrient-nutrient that is useful to our health. This paper shows sensory evaluation scores with each bar representing a mean of 8 values. The standard deviation of taste values between panelists averaged 0.116 while average standard deviation for color and texture were 0.203. This tends to imply that panelist was agreed on these three attributes analyzed for each formulation.

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INTRODUCTION

Different studies have shown that free radicals present in the human organism cause oxidative damage to different molecules, such as lipids, proteins and nucleic acids and thus are involved in the initiation phase of some degenerative illnesses. Lipid oxidation lowers the nutritive value (Addis & Warner, 1991) of food and deteriorates the flavor and taste of food. It also causes aging, heart diseases, stroke, emphysema, mutagenesis and carcinogensis (Barlow, 1990).

Generally oxidation of food can be prevented by synthetic antioxidants, including butylatedhydroxyanisole (BHA), butylatedhydroxy toluene (BHT) and propyl gallate (PG) but their safety has been questioned (Barlow, 1990). Hence, there is a need to identify new natural antioxidants for prevention of lipid peroxidation in the food industry. These antioxidant compounds are capable to prevent oxidation by neutralizing free radicals. Fruits and vegetables contain different antioxidant compounds, such as vitamin C, vitamin E and carotenoids, whose activities have been established in recent years. Beside that presence of polyphenol compounds, such as flavonoids, (Clifford, 1995), tannins, and catechins (Macheix *et al*. 1990) also contribute to beneficial effects of this group of foods. Moreover, fruits contain many vitamins, which express antioxidant activity, e.g. vitamin C, vitamin E, and β-carotene (Hernandez *et al*. 2006).

The antioxidant activity in fruits is notable since fruits are rich in compounds that have an important role in free radical-scavenging activity. Fruits which rich with antioxidants help in lowering incidence of degenerative diseases such as cancer, arthritis, arteriosclerosis, heart disease, inflammation, brain dysfunction and acceleration of the ageing process (Feskanich *et al*., 2000). Antioxidants found in fruits and vegetables protect cells from damage caused by metabolic by-products (free radicals), as well as toxic substances from food and the environment. As our bodies use oxygen to produce energy, these free radicals were formed. They damage cells, which may lead to cellular dysfunction and disease. Green apple works as an antioxidant that fights bad cholesterol (LDL, low density lipoprotein) pectin content has proven to lower cholesterol in the blood. Cucumber contains alkaline-forming minerals and is an excellent source of vitamin c and a (anti-oxidants), folate, manganese, molybdenum, potassium, silica, sulfur, and lesser amounts of vitamin b complex, sodium, calcium, and phosphorus. The alkalinity of the minerals in cucumber effectively helps in regulating the body’s blood pH, neutralizing acidity. The juice is also soothing for the treatment of gastric and duodenal ulcers. Cucumber juice is diuretic, encouraging waste removal through urination, this also helps in the dissolution of kidney stones. Apple contain a lot of essential nutrients and vitamins which should form a part of each and every person’s daily diet, in addition to their high fiber content, they also help cure diarrhoea, constipation, gout and various other problems and diseases. Celery is a vegetable belonging to the apiaceae family, it is well

Corresponding Author: Sabaianah Bachok, Faculty of Hotel and Tourism Management, Universiti Teknologi MARA (UiTM), Shah Alam, 40450 Selangor Malaysia

known for its crunchy stalks, which people often consume as a low calorie snack, the potential health benefits of celery (and its seeds) include: lowering blood pressure, reducing the risk of cancer, and preventing age-related degeneration of vision, cellery contains vitamins a, c and b1 and many minerals. other possible benefits include: treating joint pain, lowering blood pressure, and soothing the nervous system.

Based on Food Act (1983), jam can be determined as concentration of one type of fruit or more either raw, processed or semi-processed, with or without approved sweetener and pectin. Jam must contain 35 percent fruit except for fruit milk jam and ginger jam, each must contain not less than 6 and 5 percent of fruit. Jam might contain approved preservatives, coloringagent and flavor enhancer.Jam must be maintained at the final brix at 70º and acidity level at 0.8 percent to inhibit the growth of microbial (Nishizawa *et al*., 1985). Commercial production of jam is subjected to standard formulations of fruit pulp, sugar content, adjusted acidity and pectin content. Jam is a semisolid food made from not less than 45% (by weight) fruit and 55% (by weight) sugar This substrate is concentrated to about 65% or above soluble solids .Flavoring and coloring agents are added to overcome the deficiencies that occur in the fruit itself standard formulations are developed according to their end use, consumer preferences, market demand, food laws, buyers specifications and economic utilization of inputs required (Desrosier and Desrosier, 1978). Pectin is a complex mixture of polysaccharides found in many fruits and some root vegetables. Apple and the peel of citrus fruits are particularly rich in pectin. Its play vital role as a gelling agent, especially in jam making. Fruits high in natural pectin are apples, blackberries, cranberries, gooseberries, grapes and plums. Pectin is primarily used in the food industry as a gelling agent for jams, jellies and other foods (El-Nawawi&Heinkel, 1997).

Sugar needed for jam formation, about 65 percent, giving the best result (Gaman& Sherrington, 1996). Sugars will increase pectin's ability to form jell, it affects the texture and consistency of jellies and jams as they cool and set. Sugar also contributes to additional flavor component and colors either when heated to very high temperature or for extended periods. It happened due to some chemical breakdown of the sugar and Maillard reaction (nonenzymatic browning).

Lemon juice contains low pH. pH will effects gel strength, the optimum for gel formation is pH between 3.0 to 3.5. For any jams made from fruit with low pectin content, the addition of an acid will lower the pH and aid setting.

Method:

A. Sample preparations:

Materials used in this study purchased from a contract supplier that supply raw materials in Shah Alam area. Three different formulations of fruit jam or spread are being produced based on standard procedure of jam making (Satyanarayana *et al*., 2006**).** To come out with the best formulation, several formulations have been identified, modified and tested. Formulation selected had gone through hedonic sensory evaluation tests and basic shelf life study to ensure it provides the desirable taste, appearance and durable period. Table 1.0 indicates the formulations used.

The blend of fruits was added with sugar, water and other ingredient and let it caramelize. In order to get the desire texture and viscosity, pectin was being added as one of the ingredients purposely for thickens and set the jam or spread. The sample then weighted before packed into resistant plastic bottles of 250 g capacities and stored at 4ºC for later use. Figure 1.1 showed the procedure of producing *nutrilicious green spread.*

Table 3.1: Three different formulations being tested, F1 was the selected one.

Ingredient	Formula 1 (F1)	Formula 2 (F2)	Formula 3 (F3)
Celery (g)	180	190	180
Green Apple (g)	250	250	250
Cucumber (g)	220	210	220
Sugar (g)	500	700	350
Rock sugar (g)	60	-	60
Pectin (ml)	15	10	20
Lemon juice (ml)	50	50	-
Water (ml)	200	200	200

B. ***Determination of sensory properties (Hedonic sensory test):***

An untrained panel of 30 panelists was assigned to evaluate on color, texture and flavor of three different formulations of *nutrilicious green spread* . Each panel was given three samples with different code and asked to record it in the provided score sheet. The score sheet had values ranging from one representing the most disliked to 8, representing the most liked attribute (Amerine *et al*. 1965). The panelist would then taste the sample and record the score before rinsing his mouth and moving to the next coded sample.

C. Ash determination:

5.0 g of sample weighted and heated to 60 °C on a hot plate (*Hotplate Magnetic Stirrer Model 34532Snijders)* to remove all the moisture content until no more smoke released and heated in a muffle furnace

(*NEY Model 2-252 Series II)* at 600 °C for 6 hours until the ash turned white. The ash content measured using the following formula (AOAC 1995)

$$Total\ Ash\ (\%) = \frac{Ash\ (g)}{original\ sample\ weight\ (g)} \times 100$$

D. Water content determination:

Water content was determined based on the AOAC (1995) with some modification. 5 grams of sample dried in the convectional oven at 105 ºC for three hours until getting the constant weight. The weight loss reported as the percentage of water content.

$$Water\ content\ (\%) = \frac{\{\text{wet sample weight (g)} - \text{dried sample weight (g)}\}}{\{\text{wet sample weight (g)}\}} \times 100$$

E. Fat content determination:

Fat content was determinate based on *Soxhlet extraction* (AOAC 1995) with some modification. The sample was analyzed using soxhlet equipment. First of all the empty aluminum flasks weighted then 1 g of sample weighted on filter paper and put in that particular Soxhletaluminium flask. 50 ml of hexane added and attached to *Soxtec System HT1043Extractor Unit* for boiling, rinsing and toasting process. Once the extraction process completed, the flask containing fat dried up in the convectional oven at 100 °C for 20 minutes and let it cold. The weight for each aluminium jar containing fat measured.

$$Fat\ content\ (\%) = \frac{[\text{Weight of aluminum jar containing fat (g)} - \text{weight of empty aluminum jar\& (g)}]}{\text{Sample weight (g)}} \times 100$$

F. Protein content determination:

Protein content measured based on the Makrojedahl method (AOAC 1995) was using TecatorKjeltec system which consist of Tecator 2020 Digester and Kjeltec System 1026 Distilling Unit. 0.5 g of dried sample (dried for the whole night at 60 °C) was placed in the kjeldahl tube. ½ spatula of catalyst (Cu_2SO_4:K_2SO_4) and 12 ml of concentrated H_2SO_4 (95-98%) are being added. The sample heated in vaccum smoke for 45 minutes at 420 °C until it turns into clear green. Let the sample cold for 15 minutes and add in 75 ml of distilled water into the kjeldahl tube. Titrate the cold sample with 0.05M hydrochloride acid until it turns into pink color. The titration value recorded for protein content measurement.
* do the same procedure for reference (without sample added)

$$\%\,N = \frac{0.1\ \text{X (acid sample volume)} - \text{(acid reference volume)}}{\text{Sampel weight (g)}} \times 14 \times \frac{100}{1000}$$

$$\%\,Protein = \%\,N \times 6.25$$

$$Protein\ (g) = \frac{\%\,Protein \times residue\ weight\ (g)}{100}$$

G. Crude fiber determination:

Crude fiber being identified using Fibertec System M. The sample boiled in sulphuric acid solution and natrium hydroxide. The final solution, rinsed using boiling water and dried at 100 °C until constant weight measured.

$$\%\ of\ crudee\ fiber = \frac{original\ crude\ fiber\ \times 100}{Weigth\ sample\ (g)}$$

H. Carbohydrate determination:

Percentage of carbohydrate being identified using this formula:

$$Carbohydrate\ content\ (\%) = 100\% - (\%protein + \%\,fat + \%water + \%crude\ fiber + \%\,ash)$$

I. Total soluble solid determination (Brix):

Soluble solids concentration (Brix) was measured with an Atago 1T (Japan) refractometer at 20ºC (AOAC, 1984).

J. Water activity:

This method is applicable to the measurement of water activity in foods and food ingredients the water activity in the fruits was measured using an AQUALAB apparatus with direct reading (AOAC, 1984)

Result And Analysis:

A. Sensory evaluation:

Sensory evaluation scores are presented in Figure 3.1 with each bar representing a mean of 8 values. The standard deviation of taste values between panelists averaged 0.116 while average standard deviation of color and texture were 0.203. This tends to imply that panelist was agreed on these three attributes analyzed for each formulation. From the chart, there is no significance difference (p>0.05) between each formula for the color attribute. However, it is clearly showing us that formula 1 (F1) gave the highest score for flavor and texture. Hedonic score for flavor for F1 is 6.8 (almost like very much) compared to 5.87 (almost like moderately) for F2 and 5.03 (neither like no dislike) for F3.

Beside that the hedonic score for texture in the range between 6.4 (like moderately) to 4 (dislike slightly) where the sample for formula 1 (F1) got the highest score compared to F2 and F3. The difference is significant (p<0.05) between F1 with other formulations, but slightly different (p>0.05) between F2 and F3. This might contribute by the increase of pectin used where it's tougher the formulation.

It can thus be seen that the peak in taste, color and texture were at a sample from F1 when compared to F2 and F3. From these results, it showed that the sample with F1 was more preferable compared to another formulation.

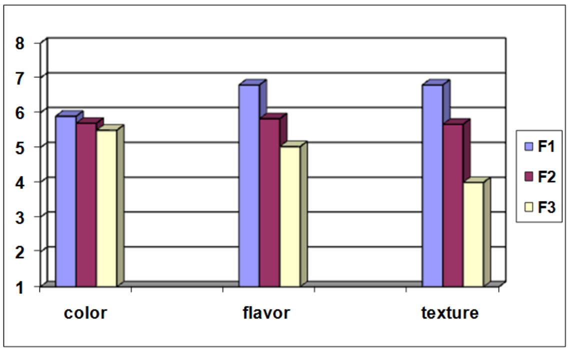

Fig. 4.1: Hedonic score for three different formulations (F1, F2, F3).

Proximate analysis being done to estimate the percentage of fat, protein, ash, carbohydrate and moisture contain in the selected formulation which is formulation 1 (F1). The sample was analyzed duplicated to get the accurate result. Table 4.1 indicates the proximate composition for *nutrilicious green spread*

Table 4.1: Proximate composition for nutrilicious green spread.

Proximate composition	Percentage of composition (%)
Protein	0.90
Fat	0.45
Carbohydrate	50.65
Ash	0.36
Moisture	35.64

The above value was the min percentage values based on duplicated samples. The result showed that this spread has been able to provide us calories since more than 50 percent of the proximate composition came from carbohydrate. It was compiled with Odhav *et al* (2007) where 100 grams of *nutrilicious green spread* can provide 7.8-14.2 grams of carbohydrate.

Conclusions:

The results showed that *nutrilicious green spread* were containing 0.90 percent of protein, 0.45 percent of fat, 62.65 percent of carbohydrate, 36 percent of ash and 35.64 percent of water. Water activity for *nutrilicious green spread* was 0.792 whereas the value of total soluble solid was 66 percent. Based on other's research and our findings, it is possible to produce the *nutrilicious green spread* that will meet the requirements for a healthy and nutritious product which served as a good source of the essential vitamin, mineral and nutrient needed for proper functioning of the body system.

REFERENCES

Abiodun, O.A., 2010. Comparative Studies on Nutritional Composition of Four Melon Seeds Varieties. Pakistan Journal of Nutrition Year, 9(9): 905-908.

Al-Howiriny, T., A. Alsheikh, S. Alqasoumi *et al*., 2010. Gastric antiulcer, antisecretory and cytoprotective properties of celery (Apiumgraveolens) in rats. Pharm Biol., 48(7): 786-93.

El-Nawawi, S.A. and Y.A. Heinkel, 1997. Factors affecting gelation of high ester citrus pectin. *Process Biochem*, 32: 381-385.

FAD/WFP, 1970. *Food Storage Manual*, Part II. Food and Commodities. Ashman, F. (Editor). Rome: FAO.

FAO, 1995. *Street foods*. *ReportofanFAOTechnicalMeetingonStreetFoods*, Calcutta, India.

Fennema, O., 1996. *Food chemistry* (2nd ed.), Marcel Dekker Inc, NY & Basel.

Feskanich, D., R.G. Ziegler, D.S. Michaud, E.L. Giovannucci, F.E. Speizer, W.C. Willett, 2000. Prospective study of fruit and vegetable consumption and risk of lung cancer among men and women. *Journal of the National Cancer Institute*, 92: 1812-1823.

Fleuriet, A. and J.J. Macheix, 2003. *Phenolic acids in fruits and vegetables*. In: *Flavonoids in health and disease*. Marcel Dekker Inc.

Food Act, 1983. *Akta 281 &Peraturan –Peraturan*. International Law Book Services. Kuala Lumpur. Malaysia.

Food Act, 1983. and Food Regulation 1985. International Law Book Services. Kuala Lumpur. Malaysia.

Gaman, P.M. and K.B. Sherington, 1996. *The Science Of Food*. Fourth edition. Butterworth Heinemann. Great Britain.

Gehring, T.A., W.M. Cooper, C.L. Holder, H.C. Thomson, 1995. Liquid chromatographic determination of thiamin in rodent feed by postcolumnderivatization and fluorescence detection. *Journal of AOAC International,* 78: 307-309.

Ghebretinsae, A.G., M. Thulin and J.C. Barber, 2007. Relationships of cucumbers and melons unraveled: molecular phylogenetics of Cucumis and related genera (Benincaseae, Cucurbitaceae). Am J Bot, 94(7): 1256-66.

Harats, D., S. Chevion, M. Nahir, Y. Norman, O. Sagee, B. Berry, 1998. Citrus fruit supplementation reduces lipoprotein oxidation in young men ingesting a diet high in saturated fat: presumptive evidence for an interaction between vitamins C and E in vivo.*American Journal of Clinical Nutrition,* 67: 240-245.

Hernandez, Y., G.M. Lobo, M. Gonzalez, 2006. Determination of vitamin C in tropical fruits: a comparative evaluation of methods. *Journal of Food Chemistry,* 96: 654-664.

Hertog, M.G.L., D. Kromhout, C. Aravanis, H. Blackburn, R. Buzina, F. Fidanza, S. Giampaoli, A. Jansen, A. Menotti, S. Nedeljkovc, M. Pekkarinen, B.S. Simic, H. Toshima, E.J.M. Feskens, P.C.H. Hollman and M.R. Katan, 1995. Flavonoid intake and long-term and risk of coronary heart disease and cancer risk in the Seven Countries study. *Archives of International Medicine,* 155: 381-386.

Hong, S.H., S.A. Choi, H. Yoon, *et al*., 2011. Screening of Cucumissativus as a new arsenic-accumulating plant and its arsenic accumulation in hydroponic culture. Environ Geochem Health, 33Suppl 1:143-9. Epub 2010 Oct 31. 2011.

Hostetler, G., K. Riedl, H. Cardenas, *et al*., 2012. Flavone deglycosylation increases their anti-inflammatory activity and absorption. MolNutr Food Res., 6(4): 558-69. doi: 10.1002/mnfr.201100596. Epub.

Kumar, D., S. Kumar, J. Singh, *et al*., 2010. Free Radical Scavenging and Analgesic Activities of Cucumissativus L. Fruit Extract. J Young Pharm, 2(4): 365-8.

Nema, N.K., N Maity, B. Sarkar, *et al*., 2011. Cucumissativus fruit-potential antioxidant, anti-hyaluronidase, and anti-elastase agent. Arch Dermatol Res., 303(4): 247-52.

Ovodova, R.G., V.V. Golovchenko, S.V. Popov *et al*., 2009. Chemical composition and anti-inflammatory activity of pectic polysaccharide isolated from celery stalks. Food Chemistry, 114(2): 610-615.

Rios, J.L., 2009. Recio MC, Escandell JM, *et al*. Inhibition of transcription factors by plant-derived compounds and their implications in inflammation and cancer. Curr Pharm Des., 15(11): 1212-37.

Rios, J.L., 2010. Effects of triterpenes on the immune system. J Ethnopharmacol, 128(1): 1-14. Epub. Review.

Rockland, L. and L. Beuchat, 1987. Water activity: Theory and applications to food, Marcel Dekker, New York.

Rosnah, S., O. Ibrahim, M.Y. Nor Khalillah, 2005. Thermophysical properties of Thai seedless guava juice as affected by temperature and concentration. *Journal of Food Engineering,* 66(3): 395-399.

Satyanarayana, A., P.P. Rao, K. Balaswamy, V. Velu, D.G. Rao, 2006. Application of annatto dye formulations in different fruit and vegetable products. *Journal of Foodservice,* 17: 1-5.

Schrader, W.L., J.L. Aguiar and K.S. Mayberry, 2002. Cucumber Production in California. Publication 8050. University of California Agricultural and Natural Resources, Davis, CA.

Sebastian, P., H. Schaefer, I.R. Telford, *et al*., 2010. Cucumber (Cucumissativus) and melon (C. melo) have numerous wild relatives in Asia and Australia, and the sister species of melon is from Australia. ProcNatlAcadSci U S A., 107(32): 14269-73. Epub.

Tang, J., X. Meng, H. Liu, *et al*., 2010. Antimicrobial activity of sphingolipids isolated from the stems of cucumber (Cucumissativus L.). Molecules, 15(12): 9288-97.

Thoennissen, N.H., G.B. Iwanski and N.B. Doan, 2009. Cucurbitacin B Induces Apoptosis by Inhibition of the JAK/STAT Pathway and Potentiates Antiproliferative Effects of Gemcitabine on Pancreatic Cancer Cells. Cancer Res, 69(14): 5876-84.

Whitney, E., L. DeBruyne, K. Pinna, S.R. Rolfes. 2007. *Nutrition For Health And Health Care*. Third edition. Thomson Wadsworth. Australia.

Woollard, D.C., 1984. New Ion-Pair Reagent For The HPLC Separation Of B-Group Vitamins In

Australian Journal of Basic and Applied Sciences, 8(23) Special 2014, Pages: 151-156

Pharmaceuticals. *Journal of Chromatography*, 301: 470-476.

Yao, Y. and G. Ren, 2011. Effect of thermal treatment on phenolic composition and antioxidant activities of two celery cultivars. LWT - Food Science and Technology, 44(1): 181-185.

Yao, Y., W. Sang, M. Zhou, *et al*., 2010. Phenolic composition and antioxidant activities of 11 celery cultivars. J Food Sci., 75(1): C9-13.

Zhang, Y., Y. Li, C. Cao, *et al*., 2010. Dietary flavonol and flavone intakes and their major food sources in Chinese adults. Nutr Cancer, 62(8):1120-7.

Zhou, K., B. Wu, Y. Zhuang, L. Ding, *et al*., 2009. [Chemical constituents of fresh celery]. ZhongguoZhong Yao ZaZhi, 34(12): 1512-5. Chinese.