

Effects of *Pegagan (Centella asiatica (L.))* Powder Addition on Chemical Substances of *Pegagan Sticks*

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ABSTRACT

The purpose of this study is to analyze the chemical contents (protein, fat, crude fiber, water, ash, and carbohydrates) of sticks made of Pegagan powder. Data were analyzed using ANOVA and continued with DMRT Test if there were differences. There were 70 Panelists in this study. The results showed that the highest level of protein obtained by Pegagan sticks with 10% addition of Pegagan valued 13.187%, the highest level of fat obtained by Pegagan sticks with 5% addition valued 12.759%, the highest level of crude fiber obtained by Pegagan sticks with 10% addition valued 0.847 %, the highest level of water obtained by Pegagan sticks with 10% addition valued 1.969%, the highest level of ash obtained Pegagan sticks with 10% addition valued 1.271%, and the highest level of carbohydrate obtained Pegagan sticks with 5% addition valued 71.843 (mg/100gr).

Keywords: *Pegagan (Centella asiatica (L.)), Pegagan sticks*

I. INTRODUCTION

Stick is one of the snack products belong to cookies with low water content so that it has a high shelf life. Sticks are widely consumed by people in rural areas and in cities as well. According to the data from the Statistics Center Agency (Badan Pusat Statistik) in 2014, the average consumption of pastries and cookies in Indonesia reached 0.195 ounces per capita per week in urban areas and 0.146 ounces per capita per week in rural areas. In 2015, there was a consumption increase in pastries and cookies with an average of 0.421 ounces per capita per week in urban areas and 0.284 ounces per capita per week in rural areas.

Stick has a crispy texture and has a savory taste. Sticks made of low-sugar dough and through making process to produce a crunchy and characterized product (Manley, 2001: 37). Sticks can be consumed by people from various ages from children to the elderly.

Sticks with the addition of mustard, carrot and spinach powder can increase water, ash, protein, and fat content, and dietary fiber of the sticks as well (Friska, 2002). The addition of dried sweet leaves (*Sauropus Androgynus*) significantly affected the levels of calcium, protein, crude fiber, and carbohydrate content of the sticks, but this did not significantly affect water, fat, and ash content, and also physical characteristic (hardness) of the sticks (Noviati, 2002).

Stick products added with vegetable powder can increase the nutritional value and active food substances so that they become functional food. "Functional food is processed food that contains one or more functional components in which, based on scientific studies, it has certain physiological functions, is proven to be harmless

and beneficial to health" (Food and Drug Monitoring Agency/ Badan Pengawas Obat dan Makanan RI, 2005). Stick is a kind of popular food in the society. Therefore, it can be added by Pegagan powder to increase nutrients and non-nutrients so that it becomes a functional food that is beneficial to health.

Pegagan (*Centella asiatica (L.)*) is one of the herbal plants that can be used in food and drinks (Hasyim, 2011). Pegagan is famous in every country so that it has a different name like gotu kola is a name for Asiatic pennywort in India and Nepal (Tawiri et al, 2011), bou-bok is the name of Asiatic pennywort in Thailand (Chaiwanichsiri et al, 2000). According to Joshi and Chaturvedi (2013), Asiatic pennywort in the USA is called (Indian pennywort/ marshy pennywort), Hawaii (pohekula), Cook Island (kapukapi), Fiji (totodro), China (fo-ti-tieng/ chi-hsueuh-tsaio), Samoa and Tonga (tono), Tahiti (tohatupaou). In addition, tsubo-kusa is the name of Pegagan in Japan (Peiris and Kays, 1996).

Pegagan traditionally used in Indonesia as a remedy for skin diseases, stomachaches, coughs, bloody coughs, dysentery, wound healing, inflammation, achy rheumatic pain, asthma, hemorrhoids, tuberculosis, leprosy, fever, and appetite enhancer (Food and Drug Monitoring Agency/ Badan Pengawas Obat dan Makanan RI, 2010). Chinese, Indian and Malaysian people use Pegagan to treat various diseases ranging from mental disorders, immune system boosting, circulatory problems, skin problems, liver diseases, epilepsy, asthma, hair loss, and tetanus (Rosalizan et al, 2008). Pegagan extract is also widely used as the main ingredient of drugs and cosmetics in Europe, USA, and Japan (Rosalizan et al, 2008).

Pegagan is made into a green salad vegetable by being finely cut then mixed with sliced green chilies, shallots, some salt, and lemon juice. Pegagan is also cooked like a curry by adding shallots, spices and coconut milk. Meanwhile, gotukola kenda is a kind of liquid porridge made from rice mixed with Pegagan and coconut milk and is usually drunk at breakfast (Peiris and Kays, 1996). Pegagan is also used as a vegetable that is daily consumed by people in West Java. Aceh people consume Pegagan leaves as a special food and as healing remedies for wounds after childbirth (Raden, 2011).

Pegagan contains triterpenoids which is a major component that determines the quality of Pegagan (Zheng et al, 2006). Pegagan also contains an essential oil component that can be used as an anti-bacterial agent (Sait et al, 1992). According to Arsyaf (2012), Pegagan contains various chemicals that are good for the human body such as asiaticoside, thankuside, isothankuside, medacasside, brahmaside, brahmic acid, modasiatic acid, meso-inositol, caretenoids, K-salt, Na, Ca, Fe, vellarine, tannin, mucilage, resin, pectin, sugar, protein, phosphorus, and vitamin B. indeed, Vellarine content causes bitter taste in Pegagan (Hermawati and Dewi, 2014).

Gotu Kola powder is made from dried Pegagan leaves which are crushed. The drying process of both vegetables and fruits by sunlight and using tools can decrease the nutrients if it is without going through the blanching process (Desrosier, 2008: 197). Blanching is a thermal working process with a temperature of 75-95 ° C for 1-10 minutes. The blanching process is used for several types of vegetables and fruits before canning, freezing, and drying processes to produce good quality products (Estiasih and Ahmadi, 2011). The purpose of this study is to analyze the chemical contents (protein, fat, water, crude fiber, ash, carbohydrate) of the sticks with Pegagan powder addition.

II. METHOD

The research used in making Pegagan sticks was an experimental study. The research design used was a completely randomized design (CRD). Data were analyzed using ANOVA if there were differences followed by DMRT (Duncan Multiple Range Test). There were 70 untrained panelists.

Table 1. Modification and Standard Recipe

Ingredient Name	Control	Pegagan Powder Addition		
		5%	7.5%	10%
Batter:				
Medium protein flour	500 g	475 g	462.5 g	450 g
Pegagan Powder	-	25 g	37.5 g	50 g
Sago flour	20 g	20 g	20 g	20 g
Margarine	150 g	150 g	150 g	150 g
Egg	120 g	120 g	120 g	120 g
Salt	10 g	10 g	10 g	10 g
Water	100 g	100 g	100 g	100 g
Cheese	100 g	100 g	100 g	100 g

Table 2. Chemical Content Analysis Material

No	Type of Analysis	Material Name
1	Water	Silica gel
2	Protein	H ₂ SO ₄ , Na ₂ SO ₄ -HgO, NaOH, methyl red, ethanol, hexane aquades
3	Fat	Silica gel
4	Ash	Phosphate buffer, ethanol, acetone, NaOH H ₂ SO ₄ ,NaOH, K ₂ SO ₄ ,
5	Crude fiber	Aquades

Table 3. Chemical Content Analysis Material

No	Type of Analysis	Method
1	Water	Oven
2	Protein	Semi Micro Kjeldahl
3	Fat	Soxhlet
4	Ash	Furnace
5	Crude fiber	Acid-base solvent
6	Carbohydrate	By difference

III. RESULTS

The analysis results of protein levels in Pegagan sticks in Table 4 showed that the protein levels of the sticks with Pegagan addition 5% had an average value of 12.660%, with addition 7.5% had an average value of 12.964% and with addition 10% had an average value of 13.187%. The data obtained were then analyzed using ANOVA. The results of ANOVA in Pegagan sticks at $\alpha = 0.05$ had the

significance value of 0.000. A value of $p < 0.05$ could be interpreted that there was a significant difference in protein levels of the sticks with different addition of Pegagan. Then, this was continued by conducting Duncan's follow-up test, which showed that protein levels of the sticks with Pegagan addition 5% differed from the addition of 7.5% and 10%. Meanwhile, the addition of 7.5% differed from the addition of 5% and 10%, but the addition of 10% had the highest protein content.

Table 4. Analysis of Protein Levels in *Pegagan*

Sample	Repetition	Protein Levels (%)	Average (%)
<i>Pegagan</i> Addition 5%	1	12.676	12.660
	2	12.644	
<i>Pegagan</i> Addition 7.5%	1	12.951	12.962
	2	12.974	
<i>Pegagan</i> Addition 10%	1	13.194	13.187
	2	13.181	

The analysis results of fat levels in Pegagan sticks in Table 5 showed that the fat levels of the sticks with Pegagan addition 5% had an average value of 12.759%, with addition 7.5% had an average value of 12.164% and with addition 10% had an average value of 11.930%. The data obtained were then analyzed using ANOVA. The results of ANOVA in Pegagan sticks at $\alpha = 0.05$ had the significance value of 0.000. P value < 0.05 could be

interpreted that there was a significant difference in fat levels of the sticks with different addition of Pegagan. Then, this was continued by conducting Duncan's follow-up test, which showed that fat levels of the sticks with Pegagan addition 10% differed from the addition of 7.5% and 5%. Meanwhile, the addition of 7.5% differed from the addition of 10% and 5%, but the addition of 10% had the lowest fat content.

Table 5. Analysis of Fat Levels in *Pegagan*

Sample	Repetition	Fat Levels (%)	Average (%)
<i>Pegagan</i> Addition 5%	1	12.774	12.759
	2	12.744	
<i>Pegagan</i> Addition 7.5%	1	12.157	12.164
	2	12.171	
<i>Pegagan</i> Addition 10%	1	11.914	11.930
	2	11.946	

The analysis results of crude fiber in Pegagan sticks in Table 6 showed that the crude fiber of the sticks with Pegagan addition 5% had an average value of 0.473%, with addition 7.5% had an average value of 0.648% and with addition 10% had an average value of 0.847%. The data obtained were then analyzed using ANOVA. The results of ANOVA in Pegagan sticks at $\alpha = 0.05$ had the significance value of 0.001. P value < 0.05 could be interpreted that there was a significant difference in crude

fiber of the sticks with different addition of Pegagan. Then, this was continued by conducting Duncan's follow-up test, which showed that crude fiber of the sticks with Pegagan addition 5% differed from the addition of 7.5% and 10%. Meanwhile, the addition of 7.5% differed from the addition of 5% and 10%, but the addition of 5% had the lowest crude fiber content.

Table 6. Analysis of Crude Fiber in *Pegagan*

Sample	Repetition	Crude Fiber (%)	Average (%)
<i>Pegagan</i> Addition 5%	1	0.499	0.473
	2	0.448	
<i>Pegagan</i> Addition 7.5%	1	0.646	0.648
	2	0.650	
<i>Pegagan</i> Addition 10%	1	0.847	0.847
	2	0.846	

The analysis results of water levels in Pegagan sticks in Table 7 showed that the water levels of the sticks with Pegagan addition 5% had an average value of 1.742%, with addition 7.5% had an average value of 1.838% and with addition 10% had an average value of 1.969%. The data obtained were then analyzed using ANOVA. The results of ANOVA in Pegagan sticks at $\alpha = 0.05$ had the significance value of 0.002. P value < 0.05 could be

interpreted that there was a significant difference in water levels of the sticks with different addition of Pegagan. Then, this was continued by conducting Duncan's follow-up test, which showed that water levels of the sticks with Pegagan addition 5% differed from the addition of 7.5% and 10%. Meanwhile, the addition of 7.5% differed from the addition of 5% and 10%, but the addition of 5% had the lowest water levels.

Table 7. Analysis of Water Levels in *Pegagan*

Sample	Repetition	Water Levels (%)	Average (%)
<i>Pegagan</i> Addition 5%	1	1.740	1.742
	2	1.745	
<i>Pegagan</i> Addition 7.5%	1	1.833	1.838
	2	1.844	
<i>Pegagan</i> Addition 10%	1	1.989	1.969
	2	1.948	

The analysis results of ash levels in Pegagan sticks in Table 8 showed that the water levels of the sticks with Pegagan addition 5% had an average value of 1.095%, with addition 7.5% had an average value of 1.192% and with addition 10% had an average value of 1.271%. The data obtained were then analyzed using ANOVA. The results of ANOVA in Pegagan sticks at $\alpha = 0.05$ had the significance value of 0.006. P value < 0.05 could be

interpreted that there was a significant difference in water levels of the sticks with different addition of Pegagan. Then, this was continued by conducting Duncan's follow-up test, which showed that ash levels of the sticks with Pegagan addition 5% differed from the addition of 7.5% and 10%. Meanwhile, the addition of 7.5% differed from the addition of 5% and 10%, but the addition of 5% had the lowest ash levels.

Table 8. Analysis of Ash Levels in *Pegagan*

Sample	Repetition	Ash Levels (%)	Average (%)
<i>Pegagan</i> Addition 5%	1	1.093	1.095
	2	1.097	
<i>Pegagan</i> Addition 7.5%	1	1.189	1.192
	2	1.196	
<i>Pegagan</i> Addition 10%	1	1.293	1.271
	2	1.249	

The analysis results of carbohydrate levels in Pegagan sticks in Table 8 showed that the carbohydrate levels of the sticks with Pegagan addition 5% had an average value of 71.744%, with addition 7.5% had an average value of 71.843% and with addition 10% had an average value of 71.643%. The data obtained were then analyzed using ANOVA. The results of ANOVA in Pegagan sticks at $\alpha = 0.05$ had the significance value of 0.038. P value < 0.05 could be interpreted that there was a significant difference in carbohydrate levels of the sticks with different addition

of Pegagan. Then, this was continued by conducting Duncan's follow-up test, which showed that carbohydrate levels of the sticks with Pegagan addition 10% did not differ from the addition of 5% and 7.5%. Meanwhile, the addition of 5% did not differ from the addition of 7.5%, but the addition of 7.5% differed from the addition of 10%. The Pegagan addition 7.5 % had the highest carbohydrate levels.

Table 9. Analysis of Carbohydrate Levels in *Pegagan*

Sample	Repetition	Carbohydrate levels (%)	Average (%)
<i>Pegagan</i> Addition 5%	1	71.717	71.744
	2	71.771	
<i>Pegagan</i> Addition 7.5%	1	71.870	71.843
	2	71.816	
<i>Pegagan</i> Addition 10%	1	71.610	71.643
	2	71.676	

IV. DISCUSSION

Analysis of protein levels in Pegagan sticks with different formulations indicated different results. The protein level of the sticks with powder addition 10% was higher compared to the sticks with powder addition 7.5% and 5%. The difference of protein level in Pegagan sticks was caused by the protein content contained in Pegagan powder added, because the formulation of the basic ingredients in making sticks did not change. Based on Intartia et al (2016), Pegagan powder contained 11.50% protein. The more Pegagan powder added to the sticks, the higher the protein levels would be.

Fat could be found in all types of food either from vegetables or animals, but the content was different. Fat was an important component in making biscuits, because it was an ingredient which functioned as giving a savory taste, adding aroma and producing a crispy texture for the products (Restyawati, 2011).

Pegagan sticks with the addition of Pegagan powder 5%, 7.5% and 10% had different fat levels. Vegetable food such as leaves had lower fat levels compared to fat levels contained in animal food (Kustiani, 2013), so that the addition of Pegagan powder gave no effects on fat levels in Pegagan sticks.

Fiber was a non-nutrient that could be mainly found in vegetable food. Crude fiber was vegetable food residue that remained after being hard-digested chemically (with dilute acid, then dilute base) in the Laboratory (Tejasari, 2005: 85). Crude fiber levels in Pegagan sticks with the addition of Pegagan powder 5%, 7.5% and 10% were different. The crude fiber level of Pegagan sticks with the powder addition 10% had the highest value. This was because the addition of Pegagan powder affected the crude fiber levels of Pegagan sticks in which the more Pegagan powder added, the more crude fiber levels of Pegagan sticks could increase. Based on the analysis of the chemical content of Pegagan powder in the study of Intartia et al (2016), the Pegagan powder contained 13.923% crude fiber.

Water had a vital function inside the body, water could also determine the quality of food. Water content contained in food also determined acceptability, freshness, and durability of the material (Winarno, 2004: 3). Water levels in Pegagan sticks with the addition of Pegagan powder 5%, 7.5% and 10% were different. Water content in Pegagan with the addition of Pegagan powder 10% had the highest value.

The water level in Pegagan sticks was affected by the addition of Pegagan powder in which the more Pegagan powder added, the higher the water levels in Pegagan sticks. The research results of Friska (2002) showed that the water levels in sticks had increased along with the addition of vegetable powder.

Ash levels were known as mineral elements or organic substances. Ash was one of components in food ingredients. Ash levels in Pegagan sticks with the addition of Pegagan powder 5%, 7.5%, and 10% were different.

The ash level in Pegagan sticks with the addition of Pegagan powder 10% had the highest value.

The difference of ash levels in Pegagan sticks was caused by the ash content contained in Pegagan powder added, because the formulation of the basic ingredients in making sticks did not change. According to the research results, Pegagan powder per 100 g contained iron 40.52 mg, calcium 2697.99 mg, and selenium 33.42 mg (Zulya, 2011). The more Pegagan powder added to the Pegagan sticks production, the more ash levels in Pegagan sticks would increase.

Carbohydrates were the main source of energy for the body. Carbohydrates had an important role in determining the characteristics of food ingredients such as taste, color, texture, and others (Winarno, 2003: 15). The determination of carbohydrate levels was analyzed using by difference method, the carbohydrate content was obtained from reducing ash, fat, water, and protein levels. Carbohydrate level of Asaitic pennywort sticks with the addition of Pegagan powder 10% had the lowest value. This was because the levels of protein, fat, water, and ash in Pegagan sticks increased along with the addition of Asiatic powder so that the amount of carbohydrate levels decreased. The results of the study were in line with the research conducted by Saputri (2014) who stated that carbohydrate levels in Pegagan cookies analyzed by difference decreased with the addition of Asaitic pennywort powder as the protein, fat, water, and ash levels of cookies increased.

V. CONCLUSION

The highest protein level attained by Asaitic pennywort sticks with the addition of Pegagan powder 10% valued 13.187%. The highest fat level attained by Pegagan sticks with the addition of Pegagan powder 5% valued 12.759%. The highest crude fiber level attained by Asaitic pennywort sticks with the addition of Pegagan powder 10% valued 0.847%. The highest water level attained by Asaitic pennywort sticks with the addition of Pegagan powder 10% valued 1.969%. The highest ash level attained by Pegagan sticks with the addition of Pegagan powder 10% valued 1.272%. The highest carbohydrate level attained by Pegagan sticks with the addition of Pegagan powder 5% valued 71.843 (mg/100gr).

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