Development of Kersen (*Muntingia Calabura*) Spread Jam as an Alternative Local Comodity Product

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Abstract. Kersen fruit is very abundant in South East Asia. It has a lot of advantages despite of the lack of the usage. The aim of this research was to develop food product form Kersen as local underused commodity. Jam produced using 100 g Kersen pulp; 60 g sugars; 20 g Apricot gel; and 0.1 ml red food colorant. 2 g and 4 g of Kersen leave powder was added as treatment. Jam produced using boiling method. End points determined using spread sheet method. Proximate and sensory evaluation was conducted during three-month storage time. Highest total sugar was found in 2 g Kersen leave powder product (37 g/100g). Addition of 4 g Kersen leave powder decrease total sugar from 35.64 g/100g to 25.14 g/100g. Product with 2 g and 4 g Kersen powder leave decrease reducing sugar from 25.54 g/100g to 5.54 g/100g and 5.37 g/100g respectively. Highest moisture and ash content found in control (45.89 g/100g and 0.72 g/100g respectively). Highest fat and protein content found in 4 g leave powder treatment (1.66 g/100g and 1.24 g/100g respectively), while highest carbohydrate found in 2 g leave powder treatment (51.33 g/100g). During three-month storage time, total sugar and reducing sugar of Kersen jam were increase, protein content decrease, while total ash amount relatively stable. Acceptable rate was decreased during storage time, where highest acceptance rate found in control (4.328 from 5 level likert chart). After three-month storage time Kersen jam with 4 g Kersen leave powder found unacceptable (2.928). Coliform was not found during storage time.

Keywords: Storage analysis, Kersen (*Muntingia calabura*), Fruit Jam.

1 Introduction

Kersen Fruit (*Muntingia calabura*) is shading tree commonly found all over the world especially in tropic area. The tree was spread all over the world from South Asia to Northern Australia. It has good adaptability to extreme climate and soil. However, the utilization of fruit as horticulture asset still very limited. It was found that in the fruit only used as minor horticultural asset in Rajshahi, Bangladesh [1]. Kersen Fruit doesn't need special cultivation method, hence the cultivation and maintenance cost for it was relatively low [2].

Kersen Fruit found to have vast potential as pharmacology or nutrient source option. It reported to perform anti-inflammatory activity [3]; [4]; [5]. It also had a potential as anti-ulcer and gastro protective agent [6]; [7]; [8]. The fruit found to content high amount of phenolic

JICOMS 2022, November 16, Jakarta, Indonesia

DOI 10.4108/eai.16-11-2022.2326046

compounds with high antioxidants activities. Fructose reported as the most abundant sugar in its fruit [9]. The fruit also contained low fermentable oligo-, di-, monosaccharides, and polyols hence Kersen Fruit classified as low FODMAPs berry. Major volatile compound in the fruit was terpenes β- Farnesene and dendrolasin. Gallic acid, cyanidin-3-O-glucoside, and gentisic acid was the main compounds found in Kersen Fruit fruit. High antioxidant activity of the fruit found because of the flavonoids contents in it such as catechin, gallocatechin, epigallocatechin, naringenin, and quercetin[10].

Kersen leaves rich of flavonoids, tannins, and saponins. These active compounds make Kersen as potential material of antibacterial agents [11]. It also performed a good nutritional potential since the addition of of 3% Kersen leave proved increase the growth of vaname shrimp [12]. Kersen leave boiled water extract found to effectively decrease blood sugar level [13]. 30% Kersen leave juices also found to perform not differently with the effect of Glibenclamide 0.02% in reducing in reducing blood sugar of male mice [14]. Kersen leaves also effectively reduce fasting blood sugar by 13% in type 2 diabetic animal model [15].

Jam has been known as favorite preserved fruit product since long. From Sasanian Persia era, it already developed in to a lot of varieties when it brought to Arab, China, and finally Europe. Consumption of jam introduced to all over the world since colonization era. Till date, fruit jam was one of major fruit preserved product that maintain it popularity. Some cultures event took it in daily bases. The forecasting market of fruit jam predicted to grow to the next 2027 (Hood, 2021). Considering the potential of jam market and the potential of Kersen fruit and leaves, it is important to develop kersen (*Muntingia calabura*) spread jam as an alternative local comodity product with Kersen leave treatment.

2 Research Methods

Material that being used in this research was Kersen fruit obtained from Bigbro Herbal Central Jakarta. Kersen fruit extracted as pulp to creat Kersen jam. Leave of Kersen was obtained from local wild Kersen tree. All chemical was obtained from Mbrio lab stock. In order to produce Kersen pupl, Kersen fruit was washed through running water and grinded to pulp using Philip HR2115 series.The pulp was weighted and stored inside deep freezer.

Kersen leaves obtained from loacl tree was dried inside MITO oven at 80˚C for 90 minutes. The dried leaves were grinded in to find powder size. The powder was shieved using 80 mesh shiever. The shieved powder was kept inside air proved plastic bag.

For every 100 g of Kersen pulp, Kersen jam was made by adding 60 g of sugars, 20 g apricot gell, and 0.1 ml food colorant (brand Koepoe Koepoe). Kersen jam produced mixing all ingredients into a mixture. The mixture was cooked with constant stirring until thick consistency has been achieved. End point was judged by sheet test. The product was packed in 150 g capacity sterilized glass jars and then stored. 2 g and 4 g of Kersen leave powder was added as treatment.

Storage analysist was conducted during 3 (three) months periods. Moisture content and total ash content was analyzed using gravimetric method. For Moisture content, 50 g sample was measured using digital ballance. The sample was placed on weighed moisture tin. Both moisture tin and sample was being weighted. The weight was being recorded. It was being ovened for 24 hours in 105˚C. After that, sample was taken from the oven and being cooled for 15 minutes. Sample was being weighted again. The lost number was measured as moisture content. For total ash analysist, 5 g of sample was taken and heated in oven in 550˚C for 20 hours. The remain of the charing process was measured as the ash content.Total fat analyzed

using soxhlet hydrolisis method. Protein content analyzed using Kjeldahl method. Total carblohydrate analyzed by difference method. Total sugar and reducing sugar was analyzed using titrimetric method. Coliform analyzed using total plate count method, while acceptance analyzed by conducting sensory evaluation to 25 semi trained panelists using 5 level hedonic test.

3. Result and Discussion

The result of the research was displayed in Table 1 bellow,

Table 1. Storage analysist result of Kersen spread jam during storage time.

Parameter	Control			Treatment with 2 gram Kersen leave			Treatment with 4 gram Kersen leave		
	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month
Total Sugar	35.64 g/100g	35.64 g/100g	35.66 g/100g	37.11 g/100g	37.11 g/100g	37.13 g/100 g	25.14 g/100 g	25. 37 g/100 g	26.1 g/100 g
Reducing Sugar	25.54 g/100g	25.59 g/100g	25.63 g/100g	5.54 g/100g	5.54 g/100g	5.56 g/100 g	5.37 g/100 g	5.65 g/100 g	6.13 g/100 g
Moisture Content	45.89 g/100g	44.98 g/100g	44.02 g/100g	45.37 g/100g	45.38 g/100g	45.38 g/100 g	45.3 g/100 g	45.37 g/100 g	45.37 g/100 g
Total Ash	0.72 g/100g	0.72 g/100g	0.72 g/100g	0.67 g/100g	0.67 g/100g	0.67 g/100 g	0.66 g/100 g	0.65 g/100 g	0.66 g/100 g
Total fat	1.48 g/100g	1.45 g/100g	1.41 g/100g	1.50 g/100g	1.51 g/100g	1.54 g/100 g	1.66 g/100 g	1.65 g/100 g	1.63 g/100 g
Protein	0.39 g/100g	0.37 g/100g	0.32 g/100g	1.13 g/100g	1.13 g/100g	1.13 g/100 g	1.24 g/100 g	1.21 g/100 g	1.18 g/100 g
Carbohydrate	50.52 g/100g	50.62 g/100g	50.69 g/100g	51.33 g/100g	51.36 g/100g	51.4 g/100 g	50.94 g/100 g	50.94 g/100 g	51.00 g/100 g
Coliform	0 colony/unit	0 colony/unit	0 colony/unit	0 colony /unit	0 colony/ unit	0 colony /unit	0 colony /unit	0 colony /unit	0 colony /unit
Acceptance	4.328	4.24	3.728	3.728	3.384	2.96	3.216	2.928	-

Overall, total sugar and reducing sugar increased during storage time for all treatments. Moisture content of control decreased while in both treatments sightly increase during storage time. Total ash relatively stable during storage time, while total fat increased in 2 gram treatment and decreased in both control and 4 gram kersen leave treatment. Protein content of Kersen jam was decreased during stirage time for control and 4 gram Kersen leave treatment, while in 2 gram leave treatment protein content relatively stable. Carbohydrate contents of al treatment was increased during stirage time. Overall acceptability were decreased in all

treatment where highest overall acceptability found in control during first month storage time. No coliform dettected during three month storage time.

Total sugar of jam increased during storage time. The founding was in accordance with Touati *et al* [16]. They also found that the ammount of total sugar of apricot jam affected by temperature of storage. Total sugar of Guava jam also increased during storage time [17]. Total sugar of Banana-pineaple blended jam also increased during storage time [18]. Total sugar in protein enriched with protein concentrate was also increased during storage time [19].

Reducing sugar of jam also increased during storage time. Reducing sugar of fruit processed product tend to increased during stirage time. The result was in accordance with reducing sugar analysis in strawbery ripple sauce [20]. In analysist of addition of many herbs in wood apple jam also found that reducing was increased during stirage time [21]. Reducing sugar also found increased during storage time in protein fortified papaya jam [22]. However the addition of Kersen leaves found to significantly reduce reducing sugar of Kersen Jam. Addition of many components found to decreased reducing sugar of jam. Addition of orange peel jam also found reduce the ammount of reducing sugar during storage time [23]. Some metabolit of yeast also performed the ability to reduce reducing sugar in beet juice [24]. Addition of stevia also found decrease reducing sugar content of strawberry jam [25].

Moisture content of control decreased while in both treatments sightly increase during storage time. Commonly, moisture content of jam increased during storage time. The founding was in accordance with some previous researches. Moisture content of papaya jam also increase during storage time [26]. Same case was found in Kinnow jam [27]. Storage analysis on value added Kendu jam also resulted the same pattern [28]. In some jam, the reduction of moisture can be affected by some additive or fiber content of jam. Jam from butter nut squash peel perform decreasement in moistrure during storage time [29]. Fiber rich xique-xique jam also experienced the same [30]. Strawberry jam from dried strawbery treated with drying and freeze dryng, also showing reducement of moisture content during storage time [31].

Total Ash of jam was relatively stable on all treatment. In development of jam from Belimbing hutan, the result was similar to the founding of this research. Total ash of jam was relative stagnant but very low [32]. Same results also found in fruit jam in Malaysian market. The ash content was stable and very low [33]. Research of Rana *et al* also found the similar pattern in mixed fruit jam analysist [34].

Total fat of control and treatment with 4 g Kersen leaves decrease during storage time. However, it increased in treatment 2 g Kersen leaves. Fat content of fruit processed product relatively stable during storaget time [35]. However in some case ther were different result. Some the factor was pH. The lower the pH of fruit product, the more probability of increasment of fat content during storage time [36]. The moisture content of product also affect the ash content of jam during storage. The less moisture content of the fruit jam, the more posibility to found the increasement of total fat in fruit jam [37].

Protein content of Kersen fruit jam was decrease during storage time. The result was in accordance with the founding protein analysist in isolate enriched papaya jam. It was found in papaya jam enriched with protein isolate, the protein content was decrease during storage time [19]. The same pattern also found in Papaya jam enriched with protein concentrate [38]. Most of protein enriched papaya jam perform decreasement in protein content during storage time [22].

Carbohydrate content of all treatment was increased during storage time. The result was inaccordance with other research in fruit jam and fruit product. Carbohydrate of fruit jam relatively increase during time. The addition of fiber will decrease the carbohydrate content

[39]. In the development of fruit jam from grape peel, the carbohydrate also increase during storage time [40].

4. Conclusion

During three-month storage time, total sugar and reducing sugar of Kersen jam were increase, protein content decrease, while total ash amount relatively stable. Acceptable rate was decreased during storage time, where highest acceptance rate found in control (4.328 from 5 level likert chart). After three-month storage time Kersen jam with 4 g Kersen leave powder found unacceptable (2.928). Coliform was not found during storage time.

Acknowledgements

Grattidue given to P3M Politeknik Negeri Media Kreatif as main sponsor of this research.

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