KONAKA
KONFERENSI AKADEMIK

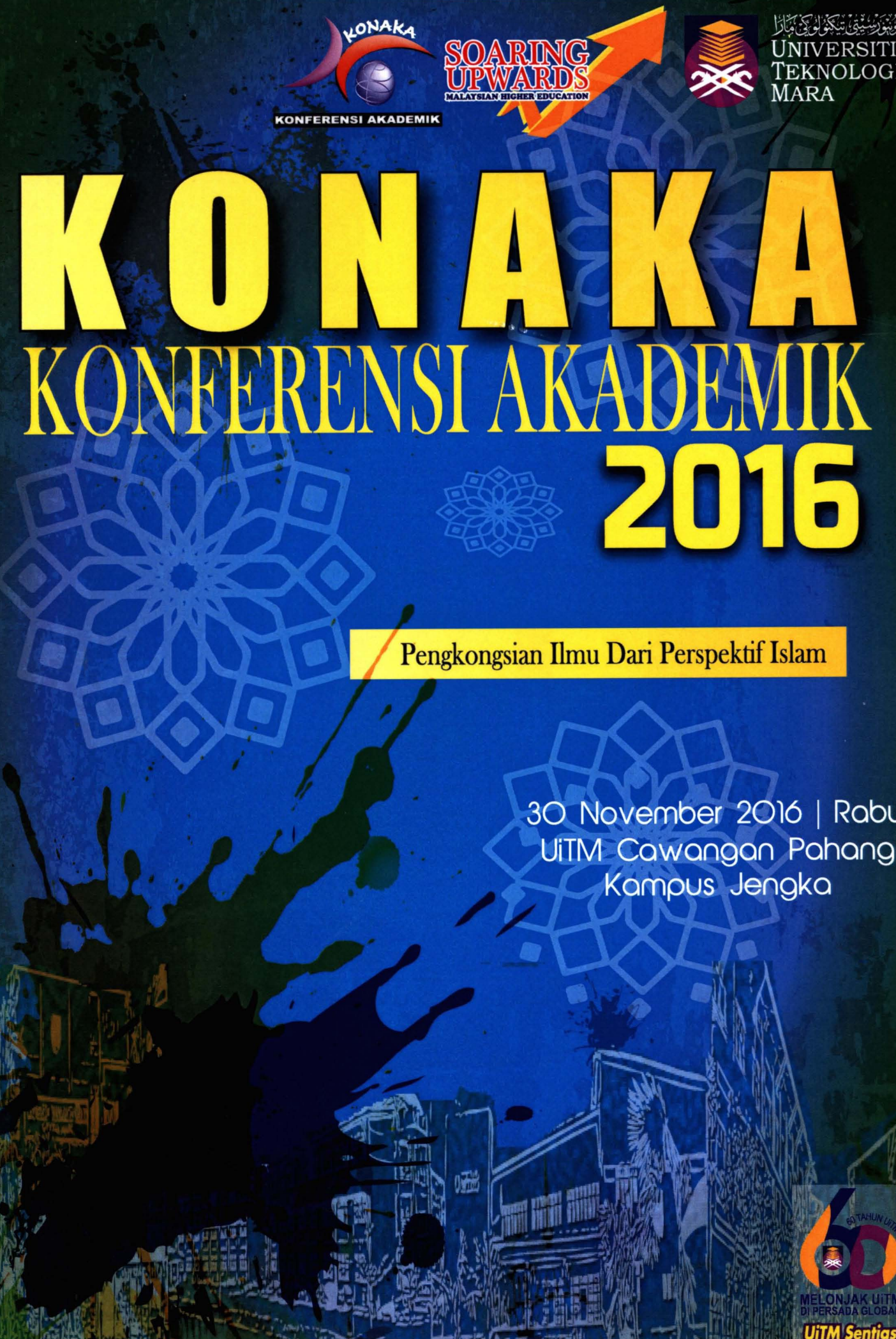
SOARING UPWARDS
MALAYSIAN HIGHER EDUCATION

UNIVERSITI TEKNOLOGI MARA

KONAKA
KONFERENSI AKADEMIK 2016

Pengkongsian Ilmu Dari Perspektif Islam

30 November 2016 | Rabu
UiTM Cawangan Pahang
Kampus Jengka



60 TAHUN UiTM
MELONJAK UiTM DI PERSADA GLOBAL
UiTM Sentiasa

Degradation Study of Vitamin C Concentration in Pomegranate Using Spectrometric Method

Nur Ain Abdul Ghafar [1], Sarah Laila Mohd Jan[2*], Mardhiah Ismail[3], Nurun Nadhirah Md Isa[4], Zurhana Mat Hussin[5], Liliwirianis Nawi[6]

[1-6]Faculty of Applied Sciences, Universiti Teknologi MARA Pahang,
Kampus Jengka, 26400 Bandar Tun Razak Jengka, Pahang, Malaysia
sarahlaila@pahang.uitm.edu.my, marismael@pahang.uitm.edu.my, nurundin@pahang.uitm.edu.my,
liliwirianis@pahang.uitm.edu.my, zurhana_mhussin@pahang.uitm.edu.my
*Corresponding Author

Abstract: Sunnah food products such as pomegranate, dates, honey and others are gain lots attention of Muslim customer nowadays. Pomegranate sold in commercial market in form of extract, juice or vinegar. Famous for its high antioxidant capacity and total phenolic contents, studies on pomegranate has gain researcher attention. The nutrition fact provided at the juice packaging does not necessarily show the exact amount of vitamin C as it claimed. The varieties of storage and packaging of juice make the consumer attracted to buy without think any consequences on the varieties. Either storage temperature or exposure of light have affected or not to the amount of vitamin C in the juice. This analysis was conducted to investigate the degradation of vitamin C concentration in pomegranate juice due to temperature and exposure of light using ultraviolet-visible (UV – Vis) spectrophotometers. Pomegranate juice samples from fresh fruits, tetra pak, glass bottle and aluminium container were stored in heat at 50 °C, cool temperature at 4 °C and room temperature 20 °C to 28 °C for 21 hours. For light exposure effect, the samples were stored at different condition which were under UV-light, sunlight and dark box. The vitamin C in fruits juice degraded in all temperature storage in contrast for the aluminium pack, which show increasing concentration of vitamin C. For the light exposure effect of the fruits juice sample, tetra pak, glass bottle and aluminium container samples showed concentration decrease in UV-light in 1 hour. The vitamin C in pomegranate juices were more easily degraded in the light exposure than in temperature storage.

Keywords: Degradation, Spectrometric, Vitamin C

1. Introduction

Pomegranates are among the healthiest fruit on earth. This fruit also being mentioned in Al-Quran and it is one of the Sunnah foods. Faten et al., (2012) mentioned that the pomegranate can act as a natural antioxidant because of its high nutrient contains crude fiber. This natural antioxidant can be consumed to prevent chronic disease and disease progression. An antioxidant is a substance that can prevent cell in the body from the activity of a free radical (Du et al., 2012). The benefit of consuming a pomegranate fruit as a source of anti-oxidant caused the demand and the production of this fruits increased every year (Ana et al., 2011b). Pomegranate peel had been analyzed for many properties like anti-oxidative ability, anti-cancer property and health-promoting qualities (Ashoush et al, 2013).

An example of the natural antioxidant in pomegranates is vitamin C. Vitamin C is a water-soluble vitamin that good for human growth and development and act as a collagen that helps the synthesis of collagen in connective tissue (Du et al., 2012). Vitamin C can be dissolved in water, so the remaining excess vitamin C can be removed from our body through urine. Some studied showed that the effect of cooking will affect the amount of the antioxidant in a food. Ana et al. (2011a) found that the cooking method changed the contain of anti-oxidant in sweet chestnuts (*Castanea sativa mill*).

Nowadays, most people consumed processed pomegranate juice instead of fresh juice due to time constraint. The daily life uptake of vitamin C is different according to age and gender. Female need about 75 milligram while male is about 90 milligram based on the

Recommended Dietary Allowance. The nutrition fact provided on the juice packaging does not necessarily show the exact amount of vitamin C as it claimed. The effect of storage temperature and exposure of light may affect the amount of vitamin C in the juice.

2. Methodology

2.1 Sample Preparation

For fresh juice, a pomegranate fruit was purchased from local market washed thoroughly with distilled water to ensure it is free from any dirt and then, the fruit was blended to get a fresh juice. The juice was homogenized and the juice was centrifuge at 1500 rpm for 15 minutes (Chang et al., 2003). Other samples from different packaging were purchased from the local market. There were three types of packaging were investigated; tetra pak, glass bottle and aluminium container.

2.2 Degradation Studies of Vitamin C: The Effect of Temperature Storage and Light Exposure

All samples were stored in the heat temperature (50 °C), cool temperature (4 °C) and room temperature (20 °C to 28 °C). The samples were stored for 21 hours and carried out in three replicate. The samples were stored at different condition including exposure under UV-light, sunlight and dark box. All samples were stored under UV-light at low wave length because the vitamin C wavelength was 265 nm not exceed 500 nm which is long wave length. The samples were placed under direct sunlight. The dark box in this experiment was covered with the black paper to avoid interferences of light from outside. Then, all the samples were analysed using UV-Visible spectrometer, UV-Vis (Perkin Elmer, UK,) at 265 nm maximum wave length for the vitamin C after stored at 21 hours for temperature effect and 1 hour in the light exposure effect.

3. Result and Discussion

3.1 Degradation Studies of Vitamin C

The commercial juices sample coming from different packaging type such as tetra pak,glass bottle and aluminium container. Meanwhile, the fresh juice was freshly prepared in the laboratory. Initial concentrations of vitamin C in samples were different due to origin of pomegranate such as fruits imported from China and commercial juice imported from Iran. This condition influenced the vitamin C content because of different soil and weather and different production factory (Nyanga et al., 2013).

Storage temperature and light exposure has shown significant effects toward vitamin C concentration. Table 1 below shows the concentration of vitamin C at different storage temperature in fresh juice fruit and commercial juice in tetra pak, glass bottle and aluminium container.

Table 1. Temperature effect on concentration of vitamin C in 21 hours

	Fruit Juice	Tetra Pak	Glass Bottle	Aluminium
Initial Concentration (mg/L)	36.55	28.632	16.858	47.2
Cool Temperature, 4 °C (mg/L)	30.275	33.208	18.586	51.894
Room Temperature,	26.109	28.399	16.9	47.179

20 °C to 28 °C (mg/L)				
Heat Temperature, 50 °C (mg/L)	33.995	28.983	17.35	47.549

After being stored at cool temperature (4 °C) for 21 hours, the concentration of vitamin C in juices decreased in all type of packaging. The fresh fruits juice sample decreased drastically compared from other. At room temperature, the vitamin C content in fruits sample was decrease but in other types of packaging it shown slightly increment. From previous studies by Rapisarda et al. (2008), it had been reported that cool temperature storage reduced the amount of vitamin C in five orange genotypes.

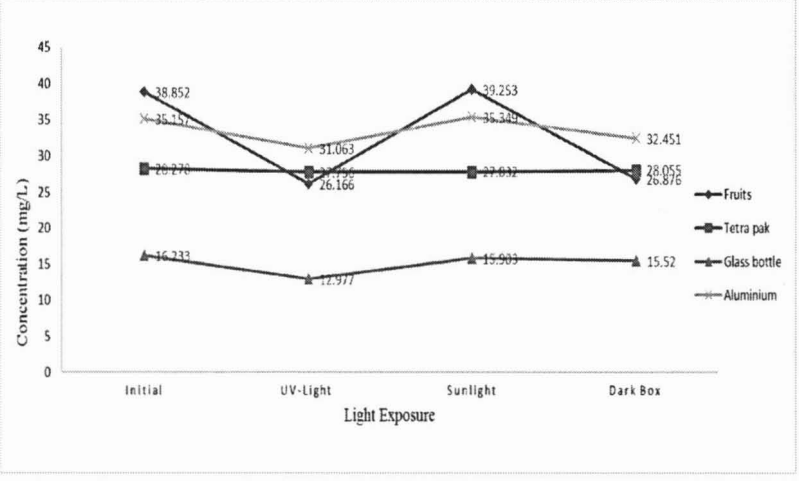


Fig. 1. Effect of light exposure on Vitamin C after 21 hours

As shown in Fig. 1, UV-light and dark box for all sample showed the deteriorated amount of the vitamin C content. Under UV-light exposure, the content of vitamin C from initial concentration decreased drastically for all samples. Otherwise, in the darkness condition, the vitamin C concentration was not reduced obviously compaed to UV-light condition. Under sunlight exposure, the fruits juice and aluminium pack samples shown an increment amount of vitamin C (38.852 mg/L to 39.253 mg/L and 35.157 mg/L to 35.349 mg/L) but the raise is not very significant. Meanwhile, for tetra pak sample and glass bottle showed the decreasing of vitamin C (28.278 mg/L to 27.832 mg/L and 16.233 mg/L to 15.903 mg/L). Previous study reported by Zhan et al.,(2014) had mentioned that both darkness and UV-light exposure reduced the amount of the vitamin C content in cauliflower head. Total of vitamin C in orange, lemon, grape fruit and tangerine juice were also decreased under UV-light exposure (Burdulu et al., 2006).

4. Conclusion

As a conclusion, the sample of pomegranate juice store at different temperature and under different lights exposure affected the contents of vitamin C regardless its different types of packaging. Vitamin C concentration shown a decreasing pattern in all condition but slightly increase under sunlight exposure in fruit juices and juice in aluminium packaging.

5. Acknowlegment

Appreciation goes to lab assistants and fellow friends in Faculty of Applied Sciences, UiTM Cawangan Pahang that involved in this research. Humble gratitude to UiTM Cawangan Pahang for opportunity given here to complete this research.

6. References

Ana,I. R. N. A. B., Fernando, M. N., Berta. G., Richard.N. B., & Ana. P. S. (2011)a. Effect Of Cooking On Total Vitamin C Contents And Antioxidant Activity Of Sweet Chestnuts (Castanea sativa Mill.), Food Chemistry Volume 128, Issue 1, 1 September 2011, Pages 165–172.

Ana,V. Albuquerque., T. G, Ana S. S., & Costa H. S. (2011)b. Ascorbic Acid Content In Exotic Fruits: A Contribution To Produce Quality Data For Food Composition Databases,Food Research International, 44, 2237-2742.

Ashoush, I. S., Batawy, O. I. E., & Shourbagy, G. A. E. (2013). Antioxidant Activity and Hepatoprotective Effect of Pomegranate Peel and Whey Powders in Rats. Annals of Agricultural Science, 58(1), 27–32.

Burdurlu, H. S., & Koca, F. K. (2006). Degradation of Vitamin C in Citrus Juice Concentrates During Storage. Journal of Food Engineering, 74, 211–216.

Chang, J. G., Jijun, Y., Jingyu, Wei.,Yun, F. L., Jing, Xi., & Yugang, J. (2003). Antioxidant Activities of Peel, Pulp and Seed Fractions of Common Fruits as Determined by FRAP Assays, Nutrition Research, 23, 1719-1926.

Du, J., Cullen, J. J., & Buettner, G. R. (2012). Ascorbic acid: Chemistry, biology and the treatment of cancer, Biochimica Et Biophysica Acta 1826, 443–457.

Lee,S.K., & Adel, A. K. (2000). Preharvest and postharvest factors influencing vitamin C content of horticultural crops. Postharvest Biology and Technology 20, 207–220.

Nyanga, L. K., Gadaga, T. H., Nout, M. J. R., Smid, E. J., Boekhout, T., & Zwietering, M. H. (2013). Nutritive value of masau (Ziziphus mauritiana) fruits from Zambezi Valley in Zimbabwe. Food Chemistry 138 (2013) 168–172.

Rapisarda.P., Bianco, M. L., Pannuzzo, P., & Timpanaro ,N. (2008). Effect of Cold Storage on Vitamin C, Phenolics and Antioxidant Activity of Five Orange Genotypes [*Citrus Sinensis* (L.) Osbeck]. Postharvest Biology and Technology, 49,348–354.

Zhan, L., Hub, J., Ai, Z., Pang, L., Li, Y., & Zhu, M., (2013). Light exposure during storage preserving soluble sugar and L-ascorbic acid content of minimally processed romaine lettuce (Lactuca sativa L.var. longifolia). Food Chemistry 136 (2013) 273–278.