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Investigating the effect of ratio *Lactobacilus acidophillus* to the antioxidant of fermented eggplant (*Solanum melongena*)

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Abstract: Fruit juice serves as a source of energy, vitamins, minerals and dietary fiber. In addition, certain fruit juices contribute bioactive compounds with different functional properties to human. Eggplant is ranked as one of top ten vegetable sin terms of oxygen radical scavenging capacity due to the fruit's phenolic constituents. Among the various processing options, lactic acid (LA) fermentation is considered as a valuable processing method for maintaining and improving the safety, nutritional and sensory properties of vegetables. In this study, the ratio of *Lactobacillus acidophilus* $1x10^{10}$ cells/ml supply to fermented eggplant have the highest level of total polyphenol and antioxidant and higher material.

Keywords: Eggplant, Antioxidant, Polyphenol, Lactobacillus acidophilus

1. Introduction

Eggplant (*Solanum melongena* L.) is one of the popular vegetables in tropical and subtropical countries [1]. Eggplant is well-known in Asian such as Egypt, China and Italia [2]. Eggplant is ranked amongst the top ten antioxidant-rich vegetables for health benefits and wellness. Further, the antioxidant and polyphenol have been found in both eggplant's skin and its flesh [3].

Fermenting fruits and vegetables is a process of producing lactic acid using fruits, veggies, sugar, salt and other ingredients. The fermented products are not only delicious, easy to digest but also enhance nutrients such as folic acid, riboflavin, niacin, thiamin and biotin and are high in antioxidant activities [7]. A recent study shows fermented cabbage enhances its antioxidant activities.

2. Material and Experimental Method

2.1. Material

- *Eggplant used in this study was originated from a farm in Dalat.*
- *Lactobacillus acidophilus was originated from department of biotechnology, faculty of chemical engineering, Ho Chi Minh City University of Technology*

2.2. Analytical Methods

Total phenolic content were evaluated by spectrophotometric method using Folin-Ciocalteu reagent [4]

The results were expressed as the equivalent to mg of gallic acid per litre of eggplant juice (mg GAE/L).

The antioxidant activity of eggplant was evaluated by FRAP (Ferric Reducing Ability of Plasma)[5].

2.3. Experimental Method

2.2.1. Investigate Fermented Eggplant

Slice eggplant, treatment browning with vitamin C 0.5% in 5 minutes. Supply *Lactobacillus acidophilus* with ratio 0; $0.5 x 10^{10}$; $1x 10^{10}$; $1,5x 10^{10}$ cells/ml. Determining total phenolic content and antioxidant activity.

2.2.2. Statistical Analysis

All experiments were performed in triplicate. Means were compared by Multiple range tests with $p<0.05$. Analysis of variance was done using the software Statgraphics plus, version 3.0.

3. Results and Discussion

3.1. Total Polyphenol of Fermented Eggplant

When adding lactic acid bacteria, the highest total polyphenol content is at the third day of the study and then gradually decreases. With additional bactera ratio is 1x 10^{10} (cells/ml), total polyphenol content peaked in the 3 rd day of fermentation is 790,908 mg GAE/L higher than experiment not supply bacteria lactic 506,817mg GAE/L.

***Table 1.** Total polyphenol of fermented eggplant after 5 days*

Day	*Ratio L.acidophillus* (cells/ml)	TPC (mg GAE/l)
1	0	423,863[bc]
	0,5 x 10^{10}	406,817[ab]
	1x 10^{10}	438,636[c]
	1,5 x 10^{10}	389,772[a]
2	0	552,273[b]
	0,5 x 10^{10}	520,454[c]
	1x 10^{10}	670,454[a]
	1,5 x 10^{10}	523,863[c]
3	0	506,817[a]
	0,5 x 10^{10}	709,091[c]
	1x 10^{10}	790,908[b]
	1,5 x 10^{10}	720,454[c]
4	0	561,363[a]
	0,5 x 10^{10}	636,363[ab]
	1x 10^{10}	677,272[b]
	1,5 x 10^{10}	672,726[b]
5	0	339,772[a]
	0,5 x 10^{10}	545,454[c]
	1x 10^{10}	492,045[b]
	1,5 x 10^{10}	542,045[c]

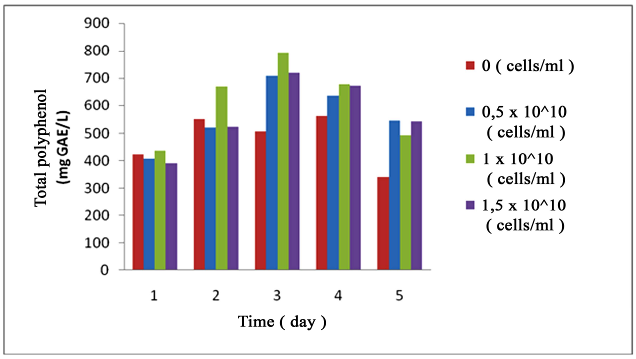

***Figure 1.** The effect of ratio L.acidophillus to the total polyphenol of fermented eggplant*

Lactic acid bacteria can produce β-galactosidase, catalyses the production of polyphenol compounds [6]. Moreover, the fermentation process softens the structure of fruits and vegetables, making phenolic easily be extracted. Thus, lactic acid fermentation increases the total polyphenol content than fermented material before.

3.2. Antioxidant Activity of Fermented Eggplant

Through Table 2 and Figure 2, we see, in the same proportion in 10^{10} cells / ml, the total antioxidant activity is the highest and the difference is significant at P> 0.05 compared to the other through the day rate up yeast. Total antioxidant activity peaked on the third day was 13,720 mmol TE / g significant difference with other treatment.

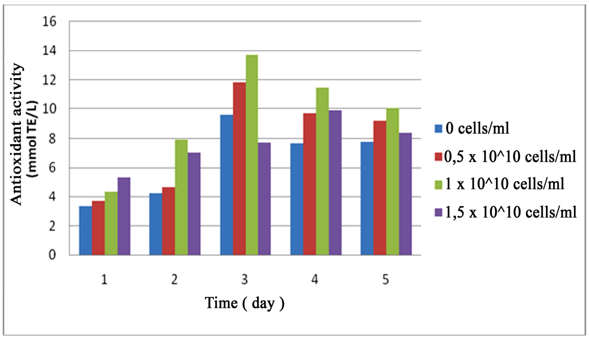

***Figure 2.** The effecting of ratio L.acidophillus to the antioxidant activity of fermented eggplant*

***Table 2.** Experimental of antioxidant activity of fermented eggplant*

Day	*Ratio L.acidophillus* (cells/ml)	Antioxidant activity (mmol TE/g)
1	0	3,367[a]
	0,5 x 10^{10}	3,692[a]
	1x 10^{10}	4,359[b]
	1,5 x 10^{10}	5,325[c]
2	0	4,267[a]
	0,5 x 10^{10}	4,665[b]
	1x 10^{10}	7,926[c]
	1,5 x 10^{10}	7,025[d]
3	0	9,607[a]
	0,5 x 10^{10}	11,814[b]
	1x 10^{10}	13,720[c]
	1,5 x 10^{10}	7,745[d]
4	0	7,664[a]
	0,5 x 10^{10}	9,699[b]
	1x 10^{10}	11,488[c]
	1,5 x 10^{10}	9,920[d]
5	0	7,761 [a]
	0,5 x 10^{10}	9,176[b]
	1x 10^{10}	10,069[c]
	1,5 x 10^{10}	8,376[d]

4. Conclusion

Total polyphenol content of eggplant seed density fermentation of 10^{10} cells / ml complement 100g eggplant is the highest maximum in the 3rd day of fermentation and then gradually decreases but remains higher than raw material. Total antioxidant activity of eggplant fermentation also increased according to the law of total polyphenol content.

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