



## International Journal OF Engineering Sciences & Management Research

### COST EFFECTIVE ON PRODUCTION OF SUGAR'S SUBSTITUTE

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**DOI: 10.5281/zenodo.60343**

#### ABSTRACT

This paper focused to study the cost of cultivation of stevia versus sugarcane to encourage the farmer regarding cultivation of this plant and also provide information regarding profitability of cultivation. Stevia become a potential substitute for sugar and renewable raw material in the food market because increasing in the number of diabetic and health conscious individual boost up the international market of high quality stevia leaves which is a non-caloric natural sugar. Very little information on the cost of cultivation of stevia specially in Malaysia context cause a lot of uncertainty with regard to cultivation of this plant and also about selection of the profitable propagating material. The present study thus concerned with calculating the cost of cultivation of stevia also calculating the break-even price of both crop, the estimated profit of stevia is much higher as compared to the sugarcane cultivation which are RM 46,000 and RM 6,200 respectively. From the breakeven price analysis also showing that stevia will give more profit compared to sugarcane where profit of RM 1.18/kg for stevia and RM 0.15/kg for sugarcane.

#### INTRODUCTION

In Malaysia, commercial sugarcane cultivation is concentrated in the northwest extremity of Peninsular Malaysia in the state of Perlis and Kedah. These areas have distinct dry season needed for cost-efficient sugarcane production. As the demand for sugar products has risen dramatically, many companies have jumped to the opportunity to grow more sugarcane by ignoring land that once consisted of native species and had little contact with humans and crops. There are many sugar alternatives on the market include sucralose, aspartame, and saccharin. However, the usage of existing sweetener and artificial sweetener like saccharin has proven unhealthy for regular consumes and carry a lot of environmental impacts.

Sugar consumption can be expected to continue its upward trend in Malaysia reflecting population and income growth. The increasing import of raw sugar to meet domestic needs and the development of re-export trade appears less become the major factors that contribute to the importance of sugar's substitute. The cultivation of sugarcane is surprisingly small in Malaysia due to the unfavourable condition, thus increasing cost of production. More research and development efforts have to be channelled to the development of alternative sources of sugar. Another sugar's substitute that is on the market today is stevia.

Stevia can be propagated by seed, tissue culture and vegetative cutting. Chalapathi et. al. (1999) reported that direct planting of stevia's stem in main field was found to have limited success. It occurs naturally on soil with pH 5 to 7.5 and usually found at area with red, alluvial, or sandy loam soil (S. D. Singh et. al, 2005). Arpita et. al, (2010) claim that stevia is a low risk cash crop and also having high yield return compared to the traditional crops with careful selection of planting material. Arpita et. al, (2010) also concluded the stevia which propagated through tissue culture guarantee certain advantages than stem cutting propagation. However, most of the study that have been conducted, seeds propagation is much more less cost compared to other methods. According to Kaiser and Ernst (2015), comparing between vegetative propagation via tissue culture and rooted cutting with seeds, the cost of cultivation through vegetatively is extremely high compared to seeds cultivation. The problem is that, the germination rate of stevia that being cultivated from seeds very low compared to the stem cutting and tissue culture methods. Therefore this research were done to estimate the production cost of planting stevia and sugarcane under favour condition and also to determine the effective cost for alternative sources of sugar in order to fulfil sugar consumption in Malaysia.

**METHODOLOGY****Study Area**

Stevia rebaudiana Bertoni seedling were used as the main material in this research. This research was conducted at under open rain shelter at UiTM Melaka, Jasin Campus.

**RESULT***Table 1: Enterprise budget for stevia cultivation*

Item	Value per acre	
	RM	RM
<b>Revenue</b>		
25 tonnes @ RM 5 per kg		125,000
<b>Variable cost</b>		
Land preparation	2,000	
Seed	25,000	
Fertilizer	30,000	
Input	20,000	
Harvesting	500	
Labour	1,500	
<b>Total Variable</b>		79,000
<b>Cost</b>		
<b>Fixed Cost</b>	0	0
<b>Total Cost</b>		79,000
<b>Estimated Profit</b>		46,000

Based on the enterprise budget above, the estimated profit accounted RM 46,000 for stevia cultivation

*Table 2: Enterprise budget for sugarcane cultivation*

Item	Value per acre	
	RM	RM
<b>Revenue</b>		
42 tonnes @ RM 0.50		21,000
<b>Variable cost</b>		
Land preparation	3,000	
Seed	5,400	
Cutting and transport	1,200	
Fertilizer	800	
Input	1,100	
Harvesting	300	
Labour	3,000	
<b>Total Variable Cost</b>		14,800
<b>Fixed Cost</b>	0	0
<b>Total Cost</b>		14,800
<b>Estimated Profit</b>		6,200

Based on the enterprise budget above, the estimated profit accounted RM 6,200.

Table 3: Partial budget to change from sugarcane to stevia cultivation

PARTIAL BUDGET			
Problem: Change from sugarcane cultivation to stevia cultivation			
Additional Cost		Additional Revenue	
	RM		RM
Seed	25,000	25 tonnes @ RM5	125,000
Fertilizer	30,000		
Input	20,000		
Harvesting	500		
Reduced Revenue		Reduced Cost	
42 tonnes @ RM 0.50	21,000	Land preparation	2,000
		Labour	1,500
A. Total additional cost and reduced revenue		B. Total additional revenue and reduced cost	
	<u>RM</u>		<u>RM</u>
	<b>96,500</b>		<b>128,500</b>
Net change in profit (B – A)			<u>RM</u>
			<b>32,000</b>

As shown in the table 3, to change from cultivating sugarcane to stevia, net change in profit is RM32,000.

#### Cost of production of stevia and sugarcane

##### i. Stevia

$$\begin{aligned} \frac{\text{Total cost}}{\text{yield}} &= \frac{\text{RM } 79,000}{25,000} \\ &= \text{RM } 3.16/\text{kg} \end{aligned}$$

##### ii. Sugarcane

$$\begin{aligned} \frac{\text{Total cost}}{\text{yield}} &= \frac{\text{RM } 14,800}{42,000} \\ &= \text{RM } 0.35/\text{kg} \end{aligned}$$

#### Break-even yield analysis

##### i. Stevia

$$\begin{aligned} \frac{\text{Total cost}}{\text{Expected yield}} &= \frac{\text{RM } 79,000}{25,000\text{kg}} \\ &= \text{RM } 3.16/\text{kg} \end{aligned}$$



ii. Sugarcane

$$\frac{\text{Total cost}}{\text{Expected yield}} = \frac{\text{RM 14,800}}{42,000\text{kg}}$$

$$= \text{RM 0.35/kg}$$

## CONCLUSION

From the cost and price analysis of the stevia and sugarcane, it was clear that profit of the two projects was comparable with each other and was technically feasible and economically viable. Stevia would give higher profit as compared to sugarcane cultivation.

## ACKNOWLEDGEMENT

The authors are grateful to management of Faculty of Plantation and Agrotechnology Universiti Teknologi MARA for their constant support and encouragement. The financial support from Research Acculturation Grant Scheme (RAGS) is highly appreciated.

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