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FEASIBILITY OF SUGARCANE FARMING USING KEPRASAN AND RATOON CULTIVING METHODS

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Abstract. Sugarcane farming in Indonesia is mostly run by the people, with contributions from smallholder plantations from 1980 until now. Malang Regency is a Regency that contributes the highest production in Indonesia. Sugarcane farming in Malang Regency was developed by the community using two cropping system models, namely the unggaran (*bongkar ratoon*) cropping system and the *keprasan* cropping system. This cropping system will affect the productivity of sugarcane. The aim of this study was to determine the differences in the advantages and feasibility of sugar cane farming with the demolition ratoon cropping system and the keprasan cropping system. The research location is in Jeding Hamlet, Rejosari Village, Bantur District, Malang Regency. The time for research starts from August-September 2022. The method of determining the sample uses the census method. All sugarcane farmers in Jeding Hamlet, totaling 50 farmers consisting of 7 farmers with the *unggaran* cropping system (unloading ratoon) and 43 farmers with the *keprasan* cropping system, were used as sample farmers. The research data were analyzed using a farming feasibility approach starting from calculating production costs, revenues, income, R/C ratio and price BEP. The results showed that the average income from sugar cane farming with the unloading system (*bongkar ratoon*) was Rp. 30,586,857 while the average income from sugarcane farming with the unloading system was Rp. 32,769,000 2) The feasibility value of sugarcane farming with the unloading system (*bongkar ratoon*) with an R/C ratio of 2.16 and an R/C value for the *keprasan* system of sugarcane farming of 2.28. The two R/C values are greater than one, so that sugarcane farming is feasible. The BEP value of the two planting models also shows that sugarcane farming is profitable at Rp. 2,471.23 for the *unggaran* planting model (*bongkar ratoon*). Meanwhile, the price BEP for sugar cane farming with the keprasan planting system is IDR 14,701.44. From these results it can be concluded that sugarcane farming using the ungaran system (*bongkar ratoon*) and sugarcane farming using the *keprasan* system are at a profitable point because the BEP value of the two sugarcane farming systems is less than the selling price of sugarcane.

Keyword: R/C; Cost; Profit; Return; Keprasan; Bongkar Ratoon

Abstrak. Pertanian tebu di Indonesia sebagian besar dijalankan oleh masyarakat, dengan kontribusi dari perkebunan rakyat sejak tahun 1980 hingga sekarang. Kabupaten Malang merupakan Kabupaten yang menyumbangkan produksi tertinggi di Indonesia. Usahatani tebu di Kabupaten Malang dikembangkan oleh masyarakat dengan menggunakan dua model sistem tanam, yaitu sistem tanam unggaran (bongkar ratoon) dan sistem tanam keprasan. Sistem tanam yang demikian akan mempengaruhi produktivitas tebu. Tujuan dari penelitian ini adalah untuk mengetahui perbedaan keunggulan dan kelayakan usahatani tebu dengan sistem tanam ratun pembongkaran dan sistem tanam keprasan. Lokasi penelitian berada di Dusun Jeding, Desa Rejosari, Kecamatan Bantur, Kabupaten Malang. Waktu penelitian dimulai pada bulan Agustus-September 2022. Cara penentuan sampel menggunakan metode sensus. Seluruh petani tebu di Dusun Jeding berjumlah 50 petani yang terdiri dari 7 petani dengan sistem tanam unggaran (bongkar ratoon) dan 43 petani dengan sistem tanam keprasan, dijadikan sebagai petani sampel. Data penelitian dianalisis dengan pendekatan kelayakan usahatani yang dimulai dari menghitung biaya produksi, pendapatan, pendapatan, R/C rasio dan BEP harga. Hasil penelitian menunjukkan rata-rata pendapatan usahatani tebu dengan sistem bongkar (bongkar ratoon) sebesar Rp. 30.586.857 sedangkan pendapatan rata-rata usahatani tebu dengan sistem bongkar adalah Rp. 32.769.000 2) Nilai kelayakan usahatani tebu sistem keprasan (bongkar ratoon) dengan R/C rasio sebesar 2,16 dan nilai R/C sistem keprasan usahatani tebu sebesar 2,28. Kedua nilai R/C tersebut lebih besar dari satu sehingga usahatani tebu layak dilakukan. Nilai BEP kedua model tanam tersebut juga menunjukkan bahwa usahatani tebu menguntungkan sebesar Rp. 2.471,23 untuk model tanam unggaran (bongkar ratoon). Sedangkan BEP harga usahatani tebu dengan sistem tanam keprasan adalah Rp 14.701,44. Dari hasil tersebut dapat disimpulkan bahwa usahatani tebu

dengan sistem ungaran (bongkar ratoon) dan usahatani tebu dengan sistem keprasan berada pada titik menguntungkan karena nilai BEP kedua sistem usahatani tebu tersebut lebih kecil dibandingkan dengan harga jual tebu.

Kata Kunci: R/C; Biaya; Profit; Return; Keprasan; Bongkar Raton

INTRODUCTION

The plantation sub-sector is one of the agricultural sub-sectors that has a major role in the development of agriculture in Indonesia. The yield potential of the plantation sub-sector is urgently needed by the processing industry as a product raw material. One of the plantation sub-sector commodities that has a strategic role is sugarcane. It is said to have a strategic role because sugar cane is the raw material for making granulated sugar, while granulated sugar itself is one of the nine basic commodities (basic necessities) for the community. Thus, the availability of granulated sugar in the market is highly dependent on the amount of raw material, namely sugarcane (Rofiqi, A., Ali, M., Lastianti, S. D., & Pratiwi, Y. I., 2018); (Hardiwan, D., Amir, A., Junaidi, J., & Delis, A., 2019)

The community is familiar with sugarcane (Saccharum officinarum L). As a plant that produces staple food in the form of sugar. Sugarcane is a commodity that has an impact on increasing state revenues. In addition to increasing state revenues, sugarcane can also increase the welfare of farmers who work in the plantation sub-sector in Indonesia. These two reasons have made the Indonesian government focus on planting sugar cane to overcome the low domestic sugar production. In essence, sugarcane plants can grow optimally in the lowlands, especially in tropical climates in accordance with the State of Indonesia (Octavianty, 2019); (Arianti, Y. S., & Saputro, W. A., 2020)

Malang Regency is one of the districts that has good potential in farming. Malang Regency has an agricultural land area of around 44,311 Ha (Statistik, B.P., 2016) agricultural land available in Malang Regency is also suitable for planting sugarcane, so that many people in Malang Regency are trying to cultivate sugar cane. Kabupaten Malang merupakan Kabupaten yang menyumbang produksi tebu tertinggi di Indonesia. Produksi gula hablur Kabupaten Malang pada tahun 2020 sebesar 208,92 ribu ton atau 21,26% terhadap produksi gula Provinsi Jawa Timur (Rusmayadi, G. , 2021). Salah satu kecamatan penghasil tebu terbesar di Kabupaten Malang adalah Kabupaten Bantur. Kecamatan Bantur memiliki jumlah produksi tebu sebesar 2.194 ton. Hasil yang diproduksi biasanya dijual ke pabrik gula yang ada di Kabuten Malang untuk menambah pendapatan petani tebu (Yunianto, M. F., Faisol, A., & Vendyansyah, N. , 2021). In the 2017-2021 range, sugarcane productivity in Bantur District has fluctuated. One reason is the planting method used. Bantur sub-district generally uses two sugarcane planting systems, namely unggaran sugar cane (bongkar ratoon) and keprasan sugar cane. By having a different system for cultivating sugarcane, the cultivation techniques are also different, so that the productivity of sugarcane is also different.

Unggaran (bongkar ratoon) is a planting method by rejuvenating plants (replanting) which aims to increase the productivity of sugar cane in tons per hectare. The implementation of the unggaran method (unloading the ratoons) is carried out by first dismantling the ratoon plant land and carrying out the conception of changing the variety. The keprasan method is a planting method with intensive maintenance of keprasan sugar cane. Unggaran (bongkar ratoon) activities need to be carried out because sugar cane seeds that have been pressed repeatedly cause a decrease in yield and affect sugar yields. Sugarcane that is pressed repeatedly will have high fiber, small and stunted stems, and there will be an accumulation of systemic diseases that become hosts for pests, so that productivity will decrease. Ungaran (unloading ratoon) needs to be done on plants that have been squeezed 3 to 4 times or more than 4 times with recommended superior varieties of plants. After the first crop is harvested/the kepras system at the base of the stem becomes the second year plant (R1/Ratoon 1). The second year's plants are harvested/pressed into the third plant (R2/Ratoon 2), and so on until the plants are dismantled and returned to the first plant.

The method of planting unggaran (bongkar ratoon) plants will have a higher productivity than keprasan. When viewed from the yield, it turns out that the unloading ratoon method also has a higher yield than keprasan. Thus, by doing unggaran (unloading ratoon) farmers will get a higher income than keprasan.

The explanation of the background above shows the need for research on the feasibility analysis of sugarcane farming which is useful for knowing the ratio of unloading ratoons and keprasan and to find out whether or not a farming business is feasible in order to obtain optimal results. This study aims to analyze the differences in profits between ungaran sugarcane (bongkar ratoon) and keprasan, as well as analyze the differences in the feasibility of farming between unggaran sugarcane (bongkar ratoon) and keprasan.

METHODS

2.1 Location, Date, Sample, and Data Analysis

The research was conducted in Jeding Hamlet, Rejosari Village, Bantur District, Malang Regency, East Java Province. This research was conducted in August-September 2022. This research used a quantitative descriptive method. The population in this study were all 50 sugarcane farmers in Jeding Hamlet. The determination of the sample farmers was carried out using the census method, which means that the entire population is taken as a sample. From the census data, there were 7 farmers using the unggaran system (bongkar ratoon) while 43 farmers using the keprasan system. The data obtained is then analyzed by analysis of the cost structure and BEP. Complete data analysis is presented as follows.

a. Production costs
   Costs incurred in cultivating sugar cane in one crop.
   TC = FC+VC
   Where: TC = total cost
   FC = fixed cost
   VC = variable cost
b. Revenue
   Revenue is the result of multiplying the price and the amount of production in a one-time investment.
   TR = P x Q
   Where:
   TR= Total Revenue
   P = Price
   Q = Production
c. Profit
   The profit is the cost of production in one planting.
   π = TR – TC
   Where:
   π = Profit
   TR = Total Revenue
   TC = Total Cost

While the business feasibility analysis is carried out with the following analysis.

a. R/C (Return Cost Ratio)
   R/C stands for return cost ratio, usually known as the ratio between receipts and costs incurred. Mathematically it can be interpreted as follows:

$$\mathrm{R/C} = \frac{Tr}{Tc}$$

   Where:
   RC = return and cost
   TR = total revenue/total penerimaan
   TC = total cost/total biaya
   Kriteria uji:
   - ❖ R/C Ratio > 1 profitable business
   - ❖ R/C Ratio = 1 farming is not a loss and no profit
   - ❖ R/C Ratio < 1 unprofitable business

b. BEP (*Break Event Point*)
   BEP is the minimum production acceptance limit and the price of a farming business does not suffer losses. The formula used is as follows:

$$\mathrm{BEP} = \frac{Tc}{P}$$

   Where:
   TC = Total Cost
   P = Price
   With the following decision-making criteria:

- ❖ BEP price < selling price, the farming is profitable
- ❖ BEP price = selling price, the farm is at the breakeven point
- ❖ BEP price > selling price, the farming is unprofitable

RESULT AND DISCUSSION

3.1 Analysis of Sugar Cane Farming

Farming analysis is a benchmark for determining the profits obtained. Farming profits can be seen from the difference between income and costs incurred (Amir, I. T., 2021). The costs of sugarcane farming using the ratoon planting system are presented in Table 1.

Table. 1. Costs of Sugarcane Farming with the Ratoon Planting System (unloading ratoon)

No.	Cost Component	Unit	Amount	Rp	Average/ Ha
A.	**Biaya Tetap**				
1	shrinkage	Rp/Unit		498.357	98.357
2	Tax	Rp/ha		942.857	942.857
	Total			**1.441.214**	**1.441.214**
B.	**Variable Cost**				
1	Seeds	Kwintal/ha		30.000	698.571
2	fertilizer				
	a. Urea	Kwintal/ha	8,57	2.300	1.971.428,57
	b. Petroganc	Kwintal/ha	8,57	1.000	857.142,86
	c. Ponska	Kwintal/ha	8,57	2.300	1.971.428,57
3	Labor				
	a. land processing	HOK	17	60.000	1.020.000
	b. Planting	HOK	31	60.000	1.877.143
	c. Labor				
	Harvest	Rp/Ton	76,09	120.000	9.130.286
	Transport	Rp/Ton	76,09	100.000	7.608.571
	Total			**375.600**	**25.134.571**
C.	**Total Cost (A+B)**				**26.575.786**

Sumber: Data Primer Diolah (2022)

Table 1 shows that sugarcane farming using a ratoon planting system has an average fixed cost of IDR 1,441,214/ha which consists of equipment depreciation costs and agricultural land taxes. The variable costs required in sugarcane farming using the ratoon planting method are IDR 25,134,571/ha. Variable costs consist of several components such as procurement of seeds, fertilizer and labor costs. Based on data on investment costs and variable costs, it can be seen that the average total cost for sugar cane farming using the bongkar ratoon planting system is IDR 26,575,786/ha for sugar cane farmers.

Table 2. Cost Components of Sugarcane Farming using the Keprasan Planting System

No	Cost component	Unit	Amount	Rp	Average/ Ha
A.	**Fixed Cost**				
1	Hoe	Unit	1	125.000	125.000
2	sickle	Unit	1	125.000	125.000
3	shrinkage	Rp/Unit		65.023	65.023
4	Tax	Rp/ha		1.355.814	1.355.814
	Total			**1.670.837**	**1.670.837**
B.	**Variable Cost**				
1	fertilizer				
	a. Urea	Kwintal/ha	12,33	2.300	2.834.884
	b. Petroganc	Kwintal/ha	12,33	1.000	1.232.558
	c. Ponska	Kwintal/ha	12,33	2.300	2.834.884
2	Labor				
	Harvest	Rp/Ton	77,9	120.000	9.345.767
	Transport	Rp/Ton	77,9	100.000	7.788.140
	Total			**225.600**	**24.036.233**
C.	**Total Cost (A+B)**				**25.707.070**

Source: Processed Primary Data (2022)

Table 2 shows the fixed costs of sugarcane farming using the keprasan planting system of IDR 1,670,837/ha. Meanwhile, the average variable cost is IDR 24,036,233/ha. So the average total costs incurred in sugarcane farming using the keprasan planting system is IDR 25,707,070/ha. This low cost is due to the fact that in sugarcane farming the hard planting system saves several variable costs such as the costs of procuring seeds and labor costs in terms of land processing and providing planting materials. The three costs eliminated by farmers have a significant impact on farmers' expenses in sugarcane farming.

3.2 Revenue Analysis

Harvesting sugar cane using the keprasan planting method and the ratoon unloading method is carried out when the plants are 8-9 months old. The product of total production and the price obtained is the income from sugar cane farming (presented in table 3).

Table 3. Revenue from sugar cane farming in Jeding Hamlet

No	Component	planting method	
		Bongkar Ratoon	Keprasan
1	Total Production(Kwintal)	5.326	33.489
2	Average of Production (Kwintal)	760,86	778,81
3	selling price (Rp/Kwintal)	75.000	75.000
4	Total Revenue (Rp/ha)	399.450.000	2.511.675.000
5	Average Revenue (Rp/ha)	57.064.286	58.411.047

Source: Processed Primary Data (2022)

Table 3 shows that the average production of sugar cane using the unloading ratoon planting system is 760.86 quintals and the average production of the keprasan planting system is 778.81 quintals. The selling price for sugar cane in general, for both the unggaran (bongkar ratoon) planting system and the keprasan planting system, is IDR 75,000 per quintal. Based on production data, it can be seen that the average farmer income for the ratoon unloading planting system is IDR 57,064,286/ha for sugar cane farmers. Meanwhile, the average farmer income for the keprasan planting system is IDR 58,411,047/ha for sugar cane farmers. The level of income of sugar cane farmers really depends on the procedures for cultivating sugar cane. To maximize revenue, farmers must pay attention to each bush of sugar cane. (Purwantoro, D., Dianpratiwi, T., & Markumningsih, S. , 2018) stated that a clump of sugar cane should have no more than 10 stems. This needs to be paid attention to so that there is no competition between sugar cane in food consumption. In addition, revenue can be increased through sugarcane planting distances. Sugarcane farming using the unggaran (bongkar ratoon) planting system is also expected to be able to select superior varieties of sugarcane seeds.

3.3 Profit Analysis

Sugarcane income is the result of sugarcane farming as a profit obtained from revenue minus production costs (Hajar, I., Susanti, A., & Prasetjono, H. , 2019); (Wibowo, E. , 2013); (Endang, S. , 2018). The results of the profit analysis of sugarcane farming using both the bongkar ratoon planting system and the keprasan planting system are presented in table 4.

Table 4. Income of Sugarcane Farmers in Jeding Hamlet

No.	Component	Bongkar Ratoon		Keprasan	
		Total	Average	Total	Average
1	Cost	185.342.000	26.477.429	1.102.608.000	25.642.047
2	Return	399.450.000	57.064.286	2.511.675.000	58.411.047
3	Profit	214.108.000	30.586.857	1.409.067.000	32.769.000

Source: Processed Primary Data (2022)

Table 4 shows the average expenditure costs of sugar cane farmers using the ratoon planting system is IDR 26,477,429/ha, while the average expenditure costs of sugar cane farmers using the bongkar ratoon system is IDR 25,642,047/ha. The results received by sugar cane farmers using the bongkar ratoon planting system were IDR 57,064,286/ha, while the average income received by sugar cane farmers using the keprasan planting system was IDR 58,411,047/ha. Based on these two data, it can be concluded that the average income of sugar cane farmers using the bongkar ratoon planting system is IDR 30,586,857/ha for sugar cane farmers, while the average income of sugar cane farmers using keprasan planting system is IDR 32,769,000/ha sugar cane farmer.

3.4 Feasibility Analysis of Sugarcane Farming

The feasibility of sugarcane farming refers to the analysis carried out to assess whether the sugarcane farming business is economically, technically and socially feasible to run (Hariadi, B., Mulawarman, A. D., Kamayanti, A., & Rahmanti, V. N. , 2016). This research uses the R/C ratio approach to assess the feasibility of sugarcane farming using both the bongkar ratoon planting system and the keprasan planting system. The results of the research that has been carried out show that farming using the unggaran planting system (unloading raton) requires costs of IDR 185,342,000,- with the average total costs incurred by farmer respondents amounting to IDR 26,477,429/ha. Meanwhile, sugarcane farming using the keprasan planting system requires a total cost of IDR 1,102,608,000,- with the average total cost incurred by respondent farmers being IDR 25,642,047/ha. Farming with the bongkar ratoon planting system received revenues of Rp. 399,450,000 with an average income for each farmer of Rp. 57,064,286/ha, while for the keprasan planting system the income was Rp. 2,511,675,000 with an average cost of income for farmers amounting to IDR 58,411,047/ha. The net income obtained by farmers from sugar cane farming using the unloading ratoon planting system is IDR 214,108,000 with the average cost of sugar cane farmers' income being IDR 30,586,857/ha, while the income received by farmers from sugar cane farming using the keprasan planting system is IDR 30,586,857/ha. IDR 1,409,067,000 with an average cost of farmer income of IDR 32,769,000/ha.

Further business feasibility is calculated based on the income and costs incurred by farmers. The results of the calculation of the R/C value that have been carried out show that the R/C for sugar cane farming using the unloading ratoon planting system is IDR 399,450,000 : IDR 185,342,000 = 2.16 while the R/C value for sugar cane farming using the keprasan planting system is IDR 2,511,675,000 : IDR 1,409,067,000 = 2.28 Based on the obtained R/C ratio value, it can be concluded that sugarcane farming using the ratoon and keprasan unloading planting system is feasible because it obtains an R/C value > 1. The results of this research are in line with those carried out by (Andri, K.B., Riajaya, P.D., Kadarwati, F.T.,, 2015) which states that the R/C value for unloading ratoon sugar cane plants is 1.05 while for keprasan sugar cane plants it is 1.68. The same thing was also found by (Arianti, Y.S., Saputro, W.A., 2020) that the R/C value for the 3rd keprasan sugar cane farming is 2.9. Based on these results, the sugarcane farming that has been carried out by farmers can bring profits to farmers. The results of the BEP price calculation show that the value for sugarcane farming with a ratoon unloading planting system is IDR 2,471.23, while the BEP price for sugarcane farming with a ratoon planting system is IDR 14,701.44. These results can be concluded that the sugarcane farming with the ratoon unloading planting system and the sugarcane farming with the keprasan planting system are at a profitable point because the BEP value of both sugarcane farming is less than the selling price of the sugarcane.

CONCLUSION

1. There is a difference in the average profit from sugarcane farming using the unloading ratoon planting system and the keprasan planting system. The average profit from sugarcane farming using the ratoon unloading planting system is IDR 30,586,857/ha. Meanwhile, the average profit from sugarcane farming using the keprasan planting system is IDR 32,769,000/ha for sugarcane farmers. The profits from farming using the unloading ratoon planting system are lower than those using the keprasan system. This is because the research was carried out for the first year of unggaran (unloading ratoon) farming.
2. There is a difference in the feasibility value of sugarcane farming using the ungaran planting system (unloading ratoon) and the keprasan planting system. The R/C value for sugarcane farming using the ratoon unloading planting system is 2.16 and the R/C value for sugarcane farming using the ratoon system is 2.28. Both R/C values are more than 1 so that sugarcane farming is worth pursuing.

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