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Economical feasibility of strawberry production in a semi-hydroponic system and agroindustry of jelly on a small property

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Abstract: Growing strawberries is a great alternative for family farms, and it is possible to obtain a good financial return on a small property. Consumption growth Strawberry "in natura" in recent years, along with a high price increase, further assists in the marketing of the fruit. This study aimed to establish a greenhouse to grow 18,000 plants cvCamarosa, with approximate production of 200 kg of strawberries daily in peak harvest in semi-hydroponic system in a family owned, located in the municipality of Cangu ɑu-RS- Brazil. The strawberry produced should be packaged for sale "in natura" and received in the form of jelly. Strawberries are classified by their diameter (25 mm and 15 mm) and defects in three classes: Class A, includes all healthy and greater than 25 mm diameter strawberries; class B, includes all the healthy strawberries and with a diameter between 25 mm and 15 mm and the class C, includes all strawberries with less than 15 mm diameter. The strawberries in classes A and B will be sold as "in natura" and class C will be used for the production of jam. To perform the economic analysis, initially used the SWOT matrix, which is a tool used to perform environmental analysis, as the basis of management and strategic planning. The financial analysis of the project was carried out through the following indications: NPV (Net Present Value), IRR (Internal Rate of Return) and payback. Through the completion of the procedures for determining the cash flow and economic indicators, it was found through studies of scenarios, keeping the price constant and equal to jam R$ 5.50, the minimum price of the strawberry "in natura" is worth R$ 6.83. The production of jelly is an alternative to adding value to the product and also provides more time for marketing.

Keywords: strawberry, semi-hydroponic, agroindustry

Citation: Ricardo Oliano de Carvalho, Miguel Borges Machado, Jorge Tiago Schwanz Göebel, Gustavo Heinrich Lang, Maria Laura Gomes Silva da Luz, Gizele Ingrid Gadotti, Carlos Alberto Silveira da Luz, Mário Conill Gomes. 2015. Economic feasibility of strawberry production in a semi-hydroponic system and agroindustry of jelly on a small property. Agric Eng Int: CIGR Journal, Special issue 2015: 18th World Congress of CIGR: 173-176.

1 Introduction

The strawberry is a fruit that belongs to the Rosaceae family. It is one of the most consumed fruit in Brazil and in the world. This fruit has many cultivars (Henrique and Cereda, 1999). The Camarosa cultivar is well adapted to the southern Brazil conditions, according to Oliveira et al. (2005). It has high production capacity, around 1038.2 g per plant, with good fruit size, color, flavor, aroma, and its pulp has good firmness.

Growing strawberries is a great alternative for small farms. It is possible to obtain a good financial return on a small property. Consumption of fresh strawberries grew in recent years, along with the price (Caminiti, 2008).

Received date: 2014-10-31 **Accepted date:** 2015-04-01
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The protected environment, such as the semi-hydroponic system, contributes to the reduction of weathering, which are difficult to set, but also to the control of temperature, humidity, and light, reducing the incidence of pests and diseases, ensuring greater productivity per area. Although reducing the attack of fungi in semi-hydroponic system, pest management is essential for a good yield (Furlani and Fernandes Jr, 1999; Fernandes Jr., 2009).

The industrialization of the strawberry which is out of the standards to be sold as a fresh fruit is an alternative to the producer to add more value and increase the validity of his crop.

According to Porter (1989), a competitive advantage is only effective for an enterprise if it allows producer to transfer values to their customers, and manufacturing costs. Thus, all activities in the supply chain can generate competitive advantages assuming strategic function.

This work aimed to study the feasibility and economical viability of deploying greenhouses for production of 18.000 plants in semi-hydroponic system with productivity around 200 kg of strawberries daily in the peak of season. Also, to establish an agribusiness for packing fresh strawberries and processing strawberries out of the standards as jelly in a small property located in southern of Brazil.

2 Material and methods

The system used was a semi-hydroponic, horizontal stands by planting seedlings of Camarosa cultivar of strawberry, in plastic packaging. The plastic bags position was ergonomic for harvesting, and allows optimal solar incidence on the plants, according to Embrapa (2005).

It was considered that the production of strawberries in the first year would be 80%, in the second year 90%, and from the third on would be a full capacity.

The harvested strawberries were classified by their diameter and defects in three classes:A: involves all healthy strawberries and diameter greater than 25 mm; B: holds all healthy strawberries with a diameter between 25 mm and 15 mm; C: holds all the strawberries with diameter less than 15 mm.

The strawberries in classes A and B will be sold as fresh fruit and class C as jelly. Studies sizing equipment for conducting unit operations and layout studies were performed.

A SWOT analysis, which is a tool used to perform environmental analysis, as the basis of management and strategic planning in a matrix, according to Ansoff (1990) and Aaker (2001) was performed.

A financing of R$ 60.000.00, by a Government Program with interest of 2% per year and MRA (Minimum Rate Attractiveness) of 11.6% were considered.

The financial analysis of the project was carried out through the following indexes: NPV (Net Present Value); IRR (Internal Rate of Return), and payback, according Buarque (1991) and Casarotto (2009).

Three scenarios considering fresh strawberry price variation, the highest revenue generator, keeping the price of jelly in R$ 5.50 (US$ 1.00 H R$2,224), set by the market analysis carried out in the region were studied. Scenarios: normal: consider that the price of fresh strawberry would be R$ 4.50; scenario the breakeven point: determine the minimum value of the fresh strawberry; optimistic scenario: consider that the price of fresh strawberry would be valued, worth R$ 7.00.

3 Results and discussion

Whereas 65% of harvested strawberries are class A and 25% is in class B, the 10% remaining will be in the class C. So, the annual strawberry production will be 18.68 kg, 16.82 kg to be marketed as fresh fruit and 740 kg as jelly. Every day will be harvested 216 kg of strawberries and these will be sorted: 140 kg in class A; 54 kg in class B and 22 kg in class C.

The area used for deployment of the greenhouses was 2,304 m ²and deployment of agribusiness was 80 m ².

Figure 1 shows the flowchart of the respective processes of producing strawberry jelly, resulting in a production of 320 units of 55 g.

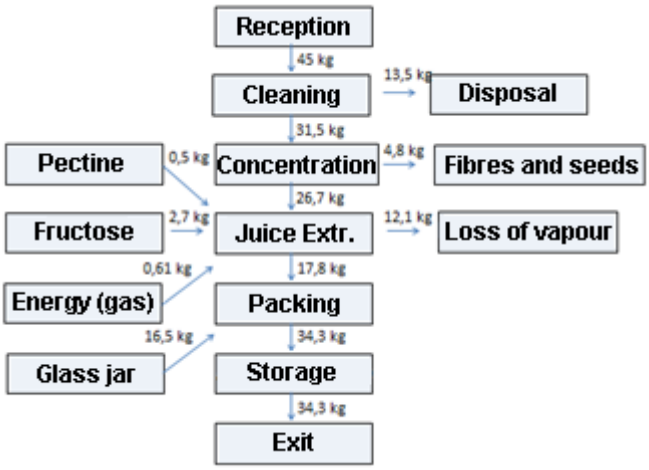

Figure 1 Flowchart of agribusiness for two days of harvest of strawberries.

The production process comprises the strawberry jelly cleaning processes for the removal of defects and the stalks, separating the juice from the fibrous parts and seeds. The juice will be taken to the hub and to it will be added pectin and fructose. Heat will be added to get the appropriate concentration of the jelly. The jelly will be packed in glass jars with lid and will be ready for commercialization.

The analysis of SWOT Matrix shows that the opportunities and strengths are: the quality, because the strawberries will have uniformity, for being classified, the availability of manual labor and fresh water resources available in the property. Logistic is a weakness due to location of the property being considered far from the consumers. The main threat will be competing greenhouses nearest of the consumer centers. Also, the environment is a threat of great importance, because greenhouses can be damaged by wind and hail.

Table 1 shows the three scenarios studied. The scenario considered normal was unfeasible because MRA is greater than the IRR and NPV index is negative, due to the high initial investment for the construction of greenhouses and agricultural industry with a small profit margin.

Table 1 Studied scenarios and their respective economical indixes.

Scenarios Index	Normal	Equilibrium Point	Optimistic
MRA (%)	11,6	11,6	11,6
NPV (R$)	-193.213,50	181,61	13.318,49
IRR (%)	-	11,63	14
Payback (yr)	-	7	6

The price at equilibrium was estimated at R$ 6.83 for fresh strawberries, which is when the project would be feasible, but would not be attractive for investment (IRR=MRA) and showed return on invested capital in the seventh year.In this case, it makes no difference to invest in the project or deploy capital in the financial market, because the return would be equal.

The third scenario, optimistic, would be attractive for investment, with a selling price of R$7.00 for the fresh strawberry and R$5.50 for the jelly, with payback in sixth year.

4 Conclusions

The design of strawberry production in a semi-hydroponic system in a small property, with sorting and packaging system, using part of the production to make jelly, can be an alternative for income generation in Southern Brazil.

The production of jelly is an alternative to adding value to the product and also provides more time for marketing class C strawberries, which do not meet the market standards for fresh fruit.

Through economical analysis it was found that the scenario deemed the price of R$ 4.50 for fresh strawberry and R$ 5.50 for jelly was not feasible.

The value calculated for the sale of fresh strawberry at equilibrium point (IRR=MRA) was R$ 6.83.

The third scenario showed viability, with the price of fresh strawberry of R$ 7.00 and R$ 5.50 for jelly,

although its investment returns only from the sixth year of implementation of the project.

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