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Analysis of the Economic and Financial Feasibility of the Production of Blackberry Brazos in the Planalto Norte atarinense

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Abstract:
Background*: Blackberry is a variety little explored in the country, especially in the state of Santa Catarina. The cultivation is characteristic of a perennial crop, but with a rapid start to production.*
Materials and Methods*: This study analyzes the feasibility of growing the fruit in the Brazos variety, for fresh consumption, with an analysis of a small property in the northern plateau of Santa Catarina with agroecological management. It uses an applied research, based on a case study and documentary, in a descriptive, quantitative and transversal way. Feasibility is analyzed through a basket of economic-financial feasibility and risk indicators*
Results*: The variety's production cycle starts after 22 months of planting, the harvest has a production period of 60 days per year, with an average yield of 4.5 kg per plant. There is an initial investment of approximately 51 thousand reais and 10.5 thousand reais of cash flow for the first 2 years, a total return on investment within 36 months, a PVLa of R$17,117.29 per hectare/year, with low business and management risk, which concludes the viability of the culture in the region, with an exception for the difficulty in scaling due to difficulties in selling in natura.*
Conclusion: *It is considered with this study that the culture of blackberry, especially the Brazos variety, adapts to the conditions of the northern plateau region of Santa Catarina.*
Although the maintenance of the crop must be carried out throughout the year as it is a perennial crop and requires care for agroecological management, even so the cost and effort for the harvest, which is only 60 days, still has higher amounts. This concentration also facilitates cash flow, as revenues are also concentrated close to harvest.
As for the return, the values of the positive viability indices and a quick return for a perennial crop, with payback in 3 years, are noted. As for the risk indicators, aspects favorable to culture are also considered, with special attention to the risk of the marketing issue, since the characteristic of the variety under study is focused more on fresh consumption, the market can be restricted and logistics a limiting factor. of marketing possibilities
Key Word*: Blackberry. Rosaceae. Rubus. Payback. Risk analysis. Multi-index..*

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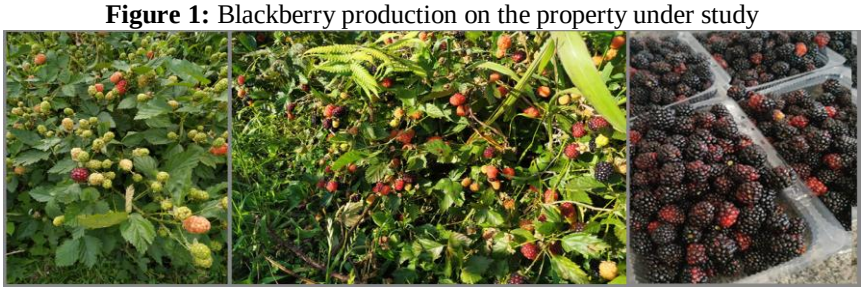
I. Introduction

With the new wave of the moment in the search for cakes, the "naked cakes" are presented as a stimulus to the search for some exotic fruits that are little used in the usual meals of Brazilians. Among these fruits, there is one that stands out due to its black color and shape, the blackberry.

The blackberry is a crop that belongs to the Rosaceae family, of the Rubus genus, in which it is estimated that there are between 400 to 500 species in America, Europe, Africa and Asia. It had its expansion in Brazil through the Amoreira-preta Improvement Program in the 70s, by Embrapa, in Rio Grande do Sul (ANTUNES, 2006). Figure 1 shows the cultivation and production of blackberry on the case study property.

Figure 1: Blackberry production on the property under study



Source: Authors (2021).

Among other aspects, the search for blackberry has had a considerable growth in recent years due to its natural properties. It has significant qualities of phenolic compounds and carotenoids, vitamins A, B and C, calcium, fiber and minerals (GUEDES et al, 2014).

This culture has a low cost of implantation, maintenance of the orchard and low need for the use of pesticides, being a convenient option for agroecological cultivation (ANTUNES, 2002).

Thus, small fruits, such as strawberries, blackberries, raspberries, etc., are characterized as an advantageous opportunity for the fruit grower, as they are cultures that make it possible to have a diversity among them and their profitable revenue is remarkably satisfactory, especially if these are cultivated in an agroecological way (ANTUNES, 2013).

Thus, this work uses as an analytical instrument the cultivation in a rural property in the city of Canoinhas-SC, where an area of 0.6 hectares of agroecological blackberry is cultivated, with family administration and operation by a rural worker. The property has Agroecological Certification by Rede Ecovida.

The crop requires a grace period between planting and the first harvest of approximately 22 months, with a production of 4.5 kilograms per plant on the property, in a non-yard, in-line cultivation, with vegetable fertilization and a density of 2000 plants per hectare.

The cultivated species is Brazos, a perennial crop, with fruit production with favorable characteristics for in natura commercialization, since its fruit is of greater size and perishability compared to other blackberry varieties.

The commercialization of the product is carried out through a solidarity commercialization cooperative, where the transport, commercialization and payment of taxes (such as FUNRURAL) is in charge of the cooperative, and a percentage commercialization amount is charged to cover all costs and expenses of the cooperative.

This work aims to analyze the economic viability of the cultivation of blackberry variety Brazos in the northern plateau of Santa Catarina. Next, a brief theoretical background on the productive and economic aspects of culture and on the methodology of multi-index analysis is presented. The research methodology, presentation and analysis of results based on multiple feasibility indicators are then detailed. Finally, the final considerations where the values are analyzed as favorable to the cultivation of the variety in the northern plateau region of Santa Catarina, especially in small properties.

2 GROUNDS

Small fruits are characterized as an attractive opportunity for the fruit grower in order to diversify production and obtain remarkable profits. The cultivation of species such as blueberry (Vaccinium spp), raspberry (Rubus spp), strawberry (Fragaria spp), cherry (Prunos L.) and blackberry (Rubus spp), can represent a great return in small areas and for well-structured companies that are committed to producing and exporting these family items. Thus, in addition to being marketed as fresh fruit, they also serve as a great option for industrialized products, pulps for yoghurt and ice cream, jellies and juices, in addition to being used as ingredients in the cosmetic and pharmaceutical industries (ANTUNES, 2013).

The designation 'small fruits' (or 'small fruits') is used in international literature to refer to various cultures such as strawberry, blackberry, raspberry, currant, blueberry, among others. The cultivation of small fruits is characterized by the high demand for labor and the possibility of obtaining a high economic return (ANTUNES, 2002 apud FACHINELLO et al., 1994).

As such, they contain significant levels of micronutrients and phytocephalons that have important biological properties (VISKELIS et al, 2012). The search for the consumption of small fruits is associated with several health benefits, such as the prevention of heart disease, hypertension, some forms of cancer and also some degenerative diseases (MANACH et al, 2004).

The small fruits belong to the Rosaceae family, of which they have a wide range of fruit and ornamental species varieties, with basic morphological characteristics, as well as the other plants present in the angiosperm group. Although widespread in the country, the Rosaceae family has a great adaptation to some

regions due to the fact that they need a cold climate for their best development (SIMÕES; SANTOS; LIMA, 2019).

The blackberry is part of the commercial group of small fruits, which include raspberry, strawberry, blueberry and the most recent physalis (SALLES, 2014). It belongs to the Rubus genus. This genus has been consumed and documented in Brazil for some time, and its fruits are used in their natural species or manipulated for the preparation of jellies, ice cream, cakes, etc. (CARPANEZZI et al, 2019).

According to Antunes 2006, it is estimated that there are between 400 to 500 species among raspberries and blackberries in America, Europe, Africa and Asia (apud BASSOLS 1980; POLING, 1996).

Previously with the arrival of settlers, in North America, there were few distinct species of blackberry. However, with the arrival of the colonizers, and with the beginning of the elimination of the forests, the blackberries spread and also allowed several species to grow side by side. In addition, bees and other insects were responsible for the exchange of pollen and birds for seed dissemination throughout the country, providing a natural improvement program (FERREIRA, 2012 apud POLING, 1996).

Because it is an expanding crop, there is not much information regarding production and planted area. However, data establish that the world production of blackberry, in 2005, was in the amount of 20,035 ha, of which 7,692 ha were cultivated in Europe, 7,159 ha in North America, 1,640 ha in Central America, 1,597 ha in South America, 297 ha in Oceania and 100 ha in Africa (ANTUNES et al, 2014 apud STRICK et al, 2007). Thus, the world production was an amount in the value of 140,292 tons on all continents.

In Brazil, the cultivation of blackberry is growing and varies from one another, from its morphological structure to other aspects, such as the quality of the fruit. It belongs to the family of commercial fruits called blackberry , developed from hybrids of plants of temperate origin (CARPANEZZI et al, 2019).

This culture in Brazil was highlighted through the blackberry improvement and development program in the 70s, in Rio Grande do Sul, with the exemption of a small collection of cultivars (Brazos, Cherokee and Comanche, in addition to a clone of the Uruguay with unknown identity). Some time later, seeds were also brought from the United States, where the Seedlings originated, more precisely from the University of Arkansas, from which they contributed to a new crossing. Thus, the cultivars launched by the improvement program of Embrapa Clima Temperado were Ébano (1981), Negrita (1983), Tupy and Guarani (1988); Caingangue (1992) and Xavante (2004) (ANTUNES et al, 2014 apud RASEIRA; FRANZON, 2012).

Thus, as it is an expanding crop, there is not much information about production and planted area, however, in 2005, data show an area in the country equivalent to 250 ha, of which it has increased in recent years worth approximately 100%, reaching around 500 ha. The main Brazilian States producing Rubus are located in the South and Southeast, but precisely in Rio Grande do Sul, Santa Catarina, Paraná, Minas Gerais, São Paulo and Espírito Santo (ANTUNES et al, 2014 apud STRIK et al, 2007) .

(...) The most important production area of these species is currently installed in the states of the southern region and part of the southeast. This fruit currently occupies a significant space on tables and restaurants in large Brazilian centers and its cultivation area has grown in recent years, but without major leaps (SALLES, 2014).

Recently, Antunes et al (2014), estimated that only in Rio Grande do Sul, it is produced in 239.2 ha, highlighting the municipalities of Campestre da Serra and Vacaria with areas of 80 and 78 ha. In Santa Catarina, the value of the producing area is estimated at 10 ha. In Paraná, the estimated area is 22.1 ha. In São Paulo, data from the 2007/2008 harvest is reported, which indicate a production area of 213.5 ha. In Minas Gerais, 40 ha. And finally, in Espírito Santo, a productive area of 3.0, due to its high altitude regions. As shown in Table 1:

Table 1: Blackberry production in Brazilian states

state	Production area (ha)
Rio Grande do Sul	239.2
Sao Paulo	213.5
Minas Gerais	40.0
Paraná	22.1
Santa Catarina	10.0
Holy Spirit	3.0
Total	**527.8**

Source: Antunes et al (2014, adapted).

In 2017, the Censo Agro showed a presence in 799 Brazilian agricultural establishments, totaling a harvested area of 1,286 hectares (IBGE, 2017). Which demonstrates that although the production is not so expressive, it is in significant expansion.

The municipality of Canoinhas-SC, in the northern plateau, according to the Census, has the largest harvested area of the crop, but with only 3 hectares, which demonstrates the low penetration of the fruit in the state (IBGE, 2017).

The search for the cultivation of blackberry is attractive for the producer and for family agriculture, as it has a low cost of implantation, maintenance of the orchard, and the gentle use of pesticides. Another factor that makes it attractive is because it is a crop with quick return, as in the second year it enters production, and so the producer already reaches market interest in the search for the in natura product, dairy and frozen products industry and in manufacturing of homemade jams, and that is why this culture is increasingly gaining added value from its product (ANTUNES, 2002).

Thus, due to the low cost of implantation, maintenance of the orchard and also the low need to use pesticides, the cultivation of Rubus presents a convenient option for agroecological cultivation (ANTUNES et al, 2014 apud ANTUNES et al 2010).

The search for blackberry consumption has increased considerably in recent years due to the fact that its fruits have significant amounts of phenolic compounds and carotenoids, which have great potential to help fight degenerative diseases. And also because they have high levels of vitamins, minerals and fiber (GUEDES et al, 2014).

The blackberry is rich in vitamin C, with its structure formed around 85% of water, 10% of carbohydrates, and with high contents of minerals and vitamins, besides being a source of ellagic acid, anthocyanins, fiber and folic acid (EMBRAPA, 2015).

Fruits contain fatty acids, which act as regulators of blood pressure, blood viscosity, immunity and inflammatory response. The blackberry in natura has a high nutritional level, also containing mineral content, vitamins B, A and calcium. International data indicate qualities of blackberry, such as ellagic acid, phenolic compounds that have antioxidant, antimutagenic and anticancer functions (ANTUNES et al, 2014).

In relation to the planting of the crop, soil suitable for the cultivation of blackberry is that which has a better drainage system, with a good water retention capacity and a good content of organic matter. Generally, soils with a pH around 5.5 to 6.0 are the best soils, due to the fact that they are slightly acidic (PAGOT et al, 2007).

Regarding pH, there are a number of indications and many divergences between the recommendations found in the literature. According to Ilha (2012), before the installation of the orchard, at least three months before, limestone is applied, preferably dolomite, to raise the pH to 5.5. However, Fernandez and Ballington (1999) suggest that the most satisfactory soils are those with a pH of 6.0 to 6.5. In turn, Grandall (1995) indicates the range between pH 5.5 and 6.5 as the best for blackberry (ANTUNES, 2014).

In the soil preparation phase, it can be done with plowing and harrowing the entire area or just on the line where the crop will be introduced, leaving the spaces between the lines with the existing vegetation. In cultivated areas with a slope greater than 5%, the line preparation system protects the soil from erosion and needs to be carried out in contour lines with a slope of 1%. The space between the lines should be 2.5 to 3m, depending on the equipment to be used in mowing between lines (EMBRAPA, 1997).

Regarding the fertilization practice and the nutrient response, there is little information, however, currently the fertilization recommendation is based on soil analysis, with application of nitrogen, phosphorus and potassium doses, observing the recommended organic matter contents (ANTUNES et al, 2014).

The climate is also an important factor to define the favorable regions for the cultivation of blackberry in Brazil, that is, it is what plays a greater or lesser influence on the plant's development. The blackberry adapts well in regions with a moderate climate in summer, without excessive light and with adequate rainfall levels. The cold, in turn, is a very important factor during the dormancy period, providing a good rate of sprouting. However, occurring out of season, it can cause serious damage to buds, flowers and fruits in the development phase. In general, the blackberry is resistant to frost due to the fact that it is a temperate plant (EMBRAPA, 2004).

Regarding management, efficient techniques for changing the production period are extemporaneous pruning and application of growth regulators. The pruning of this crop can be done in two moments: one in summer, when the stalks that have produced are eliminated and the new stalks that have emerged from the ground are shortened, and another in winter, reducing the stalks on the sides (ANTUNES et al, 2014).

Thus, cleaning pruning is carried out in the summer, eliminating the branches that produced during the year, cutting them close to the ground, and in the winter, the sides are pruned to force the sprouting of branches for the next crop (EMBRAPA, 1997).

This culture has very delicate and fragile fruits, which require greater care when harvesting, handling and transporting. Thus, it is recommended that the harvest be carried out in the morning, preferably in the early

hours, and that the fruits are quickly removed from the field, as the exposure of the fruits to the sun, or at high temperatures during transport, becomes sufficient to a loss of fruit color and dehydration. The reduction of contact at an excessive temperature may prolong the post-harvest storage period (ANTUNES et al, 2014).

Thus, it is extremely important to use techniques that extend the storage time of the fruit, without altering the physical, organoleptic and nutritional characteristics. Thus, for the fruit to be preserved, pre-cooling is the first important step in post-harvest management (FERREIRA, 2012; ABREU et al., 1998).

The Brazos quality is kept in a refrigerated environment at 2ºC, and can be stored for up to nine days after harvest (ANTUNES et al, 2014). This variety is precocious and with large fruits (on average 6 to 7g), with an acidic and astringent taste with a firm consistency. The plant is semi-erect and when pruning is carried out well, it eliminates the need for a espalier, which are frames that help sustain the plants (EMBRAPA, 1997).

The production of blackberry in Brazil, unfolds between the months of October to February, however, production outside that time becomes an excessively profitable option economically, since the remuneration can be approximately 700% higher than the normal period of the harvest. Anticipation or delay will be possible through the modification of environmental factors and/or management techniques, however, it is appropriate that the crop has a low requirement for cold and heat to sprout, as well as a shorter period for flower formation and fruits (ANTUNES et al, 2014).

Many risks are noticeable in this crop, among them, pests and diseases are the ones that can most affect the rural producer. In this way, numerous pests are capable of attacking the blackberry crop.

Pagot et al, 2007, states that in disease hypotheses, management strategies are associated with cultural, physical, biological methods and the chemical protection of plants with the use of fungicides. The intensity of use varies according to the production system adopted by the producer (conventional, organic or integrated).

In southern Brazil, the known pests and diseases are: Botrytis or gray mold (Botrytis cinerea), fruit anthracnose (Colletotrichum gloeosporioides), branch canker (Botryosphaeria dothidea), orange rust (Gimnoconia nitens), fruit rust branches and leaves (Kuehneola uredinis) and blackberry rust (Phragmidium violaceum), crown gall (caused by the soil bacterium Agrobacterium Tumefasciens), blackberry borer (Eulechriops rubi Hespenheide) and fruit flies (Anastrepha spp). Thus, the control recommendations highlight the importance of using healthy seedlings and prophylaxis, which aims to reduce the sources of inoculum and its evolution in production (EMBRAPA, 2007).

The average ticket paid to the producer varies according to the time of production and the way in which it is sold. In natura marketing is still practiced in a minority, generally at fairs in the main distribution centers in the South and Southeast of the country. Industrialization, on the other hand, becomes more common due to the fact that the fruit has a shorter shelf life (ANTUNES et al. , 2014).

O blackberry's high cost, high perishability and lack of publicity in the national market are major impediments to its commercialization. In 2007, 125 g containers of imported blackberry, raspberry and blueberry were sold on average for R$15.90 in retail in the city of São Paulo. Due to the fact that there are few producing properties, there is no buying preference when it comes to the origin, unlike what happens with most fruits. Thus, the main requirements are based on the principle of the structure of the fruit itself, such as its firmness, color, sweetness and presentation, where any unevenness of these aspects makes the fruit unattractive to be marketed (FAGUNDES, 2007).

There are several ways of processing the fruit, EMBRAPA's 1997 collection Plantar blackberry indicates some of these ways of using the blackberry, through distinct and elaborate recipes to manufacture liqueurs, cakes, ice cream and so on.

Second Richetti (2016), the determination of agricultural production costs enables an assessment of the profitability, profitability and efficiency of the production system. Thus, the knowledge acquired by these aspects ends up becoming indispensable for any rural property, regardless of its size, field of activity or production system adopted, allowing for technical assessments for the effective development of a self-sustainable and competitive agriculture for the rural producer.

The viability of fruit production on the direct interference of costs, whether investment or operation. Cost, by definition, is the application of human resources, equipment, materials and inputs in the process of creating a specific product, service or result (BARBOSA et al., 2011).

Barbosa et al. (2011) also mentions that an idea can be considered excellent, but not according to economic-financial restrictions, not bringing so many benefits considering the costs involved.

All costs and revenues involved in analyzing the viability of a crop are subject to a degree of risk, with the values considered mostly just probabilistic. However, Salles et al. (2011) mentions that treating variations in a project as totally unpredictable are the result of our culture of not managing risks.

As the costs of the risks involved can be high, even good ideas with possible returns may have risks that become critical and make projects unfeasible due to their high impact impact value (BARBOSA et al., 2011).

Monte Carlo simulation is applied through computer software that perform statistical analysis, performing repetitive tests, so that they produce a probabilistic distribution of possible selected results (SALLES et al., 2010).

The Monte Carlo method provides the presentation of the results context in a more integrated and comprehensive way, through the use of probability distributions in the project estimates (SALLES et al., 2010). In summary, it is possible to simulate the execution of a project by randomly varying the independent variables and checking the dependent variable (BARBOSA et al., 2011).

The Monte Carlo method provides an estimate of the probabilities of obtaining specific project results, usually in terms and costs arising from the simulated execution (through models) of the project and probability distributions (SALLES et al., 2010).

According to Barbosa et al. (2010), the degree of accuracy or expected variation of a cost estimate depending on the application area can vary due to various influences such as changes in scope, time, risks, acquisitions, among others.

To analyze the project and its viability, especially when considering risks, if we do an analysis by just one indicator, we may run the risk of having a short-sighted view. To assist managers in their decisions, there are several techniques and tools available to analyze and choose the best investment alternative (JOHANN and DUCLÓS, 2009).

The Multi-Index Methodology aims to give the decision maker a broad view:

The multi-index methodology makes it possible to compare the degree of risk involved with the expected return, measuring whether the return is attractive against the risk, for the assessment of project acceptance or rejection. For this, variations of the classic feasibility analysis tools (Payback, NPV, IRR) are used in the form of indicators, in addition to other indices derived from the management's perception of risk. The advantage of using the multi-index methodology, therefore, lies in the standardization of the various forms of analysis in indicators and the breakdown of risk into five dimensions: Financial Risk (TMA/TIR), Risk of non-recovery of invested capital (Payback/N), Operational Risk (Degree of Commitment of Revenue - GCR), Management Risk and Business Risk. This decomposition allows the comparison of risk factors and the project's own profitability. In addition, the use of a set of indicators enables a more complete analysis, resulting in safer and more accurate information than the isolated use of each technique (SOUZA et al., 2017 apud SOUZA and CLEMENTE, 2008).

In this way, combining an analysis of costs, a statistical method and a multi-index view, the precision for the decision-making process is increased.

Diabetes is now commonly recognized as a coronary heart disease risk equivalent[1,2,3,4].This is mainly attributed to the high rates of dyslipidemia among diabetic patients which is believed to be one of the major factors accounting for the high percentage of deaths among diabetics due to cardiovascular disease (CVD)[5].Numerous epidemiological studies and randomized controlled trials have documented the association between elevated LDL-C levels with increased CVD risk in both diabetic and non diabetic populations.[6,7]. Thus reducing LDL-C levels is the primary goal of therapy for diabetic dyslipidemia.[5,8].Statins are considered the first pharmacological line of treatment of dyslipidemia in diabetic patients[9]. Lowering of LDL-C levels is thought to be the main beneficial effect of statin treatment.In India currently no guidelines available for treating diabetic dyslipidemia and no previous study has documented the efficacy.The current study aims to build growing awareness of atherosclerosis specific care of diabetes patient by examining efficacy of two most commonly prescribed statins in India.

II. Material And Methods

As for the scientific method, an applied research is used, based on a case study and documentary, in a descriptive, quantitative and transversal way.

For the feasibility analysis the Multi-Index Methodology is used. For financial return analysis, Present Value (VL), Net Present Value (NPV), Annualized Net Present Value (NPLa), Benefit Per Cost Index (IBC) and Additional Return on Investment (ROIA) are considered. As for the risk analysis, the Internal Rate of Return (TIR), TMA/TIR Index, Simple Payback, Discounted Payback, Business Risk and Management Risk indicators are used.

As parameters and assumptions for the calculations, it is considered:

- Minimum Attractiveness Rate (TMA): 3% per year;
- Analysis period: 5 years
- Reference area: weighting of all information for 1 hectare of cultivated area.

The Monte Carlo methodology is used as a tool for probabilistic cash flow analysis, with the application of the Oracle Crystall Ball tool.

III. Result

The production cycle is basically composed of a single planting stage, since the crop is perennial, a permanent maintenance of cleaning and fertilization, where the organic material extracted during cleaning is crushed and used for fertilization of the plants, a conduction pruning before the flowering, a period of approximately 60 days of production and an aggressive annual pruning after the productive period. We can see in Table 2 the temporal distribution of the stages distributed in the 5 years of analysis of this work.

Table 2: Productive cycle of the Brazos blackberry

Year	months	Milestones of the Productive Cycle
1	january	Planting
	feb - ten	Cleaning and fertilization management
two	Jan - Jul	Cleaning and fertilization management
	now	Pruning before flowering
	Aug - Sep	Cleaning and fertilization management
	Oct - Nov	Harvest
	ten	Revenue
3	january	annual pruning
	Feb - Jul	Cleaning and fertilization management
	now	Pruning before flowering
	Aug - Sep	Cleaning and fertilization management
	Oct - Nov	Harvest
	ten	Revenue
4	january	annual pruning
	Feb - Jul	Cleaning and fertilization management
	now	Pruning before flowering
	Aug - Sep	Cleaning and fertilization management
	Oct - Nov	Harvest
	ten	Revenue
5	january	annual pruning
	Feb - Jul	Cleaning and fertilization management
	now	Pruning before flowering
	Aug - Sep	Cleaning and fertilization management
	Oct - Nov	Harvest
	ten	Revenue

Source: Authors (2021)

The initial investment is associated with the structure for product packaging, tooling for maintenance, harvesting and packaging, cleaning and fertilizing equipment and personal protection equipment, as shown in Table 3.

Table 3: Investment for the production of the Brazos blackberry

Description	Unit	The amount	Unit Value (BRL)	Price R$)
Packing room	square meter	16	1974.30	31,588.80
Stainless steel countertop table (2000x700x900mm)	unity	1	1,500.00	1,500.00
Balance	unity	1	400.00	400.00
seedlings	unity	2000	5.00	10,000.00
planting labor	hour	80	10.55	844.00
Basic Tooling	unity	1	300.00	300.00
Baskets for harvest	unity	30	45.00	1,350.00
Plastic fruit box	unity	30	25.00	750.00
Cutter	unity	1	1,500.00	1,500.00
Gasoline Crusher	unity	1	2,400.00	2,400.00
EPI Kit	unity	1	600.00	600.00
	Total			**51,232.80**

Source: Authors (2021)

Costs and expenses are divided into:

- maintenance costs and expenses: where it involves cleaning, fertilizing and pruning costs, basically being labor, fuel and equipment maintenance.;
- harvest costs and expenses: where it involves labor and packaging costs;
- marketing costs and expenses: percentage value of the gross revenue from payment for the services of the marketing cooperative where expenses with transportation, marketing and taxes are included.

Table 4 shows the values accumulated over the 60 months and the share of costs, the most significant being the cost of marketing the products. It is noted that a large part of the costs are concentrated in the costs of marketing it, which is carried out through a cooperative for the marketing of agroecological agricultural products. There is also a concentrated effort of labor in the harvest, which in 60 days surpasses the expenses and labor expenses of the entire year with maintenance.

Table 4: Costs and expenses for the production of Brazos blackberry

Type	Price R$)	Spending share (%)
Maintenance Expenses	13,894.00	9.14
Harvest Expenses	19,264.00	12.68
Marketing Expenses	118,800.00	78.18
total expenses	**151,958.00**	**100.00%**

Source: Authors (2021)

Revenues are annual, usually in December, starting in the second year after planting, as shown in Table 5. Although the devaluation of capital over time is considered in this study, no correction factor is applied to the revenues, given the uncertainty of the increase in the value received by the product.

Table 5: Brazos blackberry production recipes

Year	Quantity (kg)	Unit value (BRL)	Gross revenue (BRL)
two	9,000	9.80	88,200.00
3	9,000	9.80	88,200.00
4	9,000	9.80	88,200.00
5	9,000	BRL 9.80	BRL 88,200.00

Total	**BRL 352,800**

Source: Authors (2021)

IV. Discussion

The cash flow is shown in Table 6, showing the monthly cash flow amount, simple accumulated value, annual synthesized present value with monthly discount and accumulated present value. It requires an initial contribution of R$51,232.80 and an amount of R$10,458.00 in working capital for the first 2 years, with a return of a large part of the capital already in the first harvest in the twenty-fourth month.

Table 6: Free and discounted cash flow

Year	Free Cash Flow - FCL (BRL)	Accumulated FCL (BRL)	FCL Present Value (BRL)	Accumulated Present Value (BRL)
0	(54,103.80)	(54,103.80)	(54,061.77)	(54,061.77)
1	50,913.00	(3,190.80)	48,049.30	(6,012.47)
2	50,652.00	47,461.20	46,403.78	40,391.31
3	51,074.00	98,535.20	45,438.41	85,829.72
4	51,074.00	149,609.20	44,114.96	129,944.68

Source: Authors (2020)

Considering the TMA of 3% pa, initial investment of R$51,232.80, period of 5 years, the return indicators are shown in Table 7. It is noted a net present value of the investment (NPV) in 5 years of R$78,392, 19, with an annualized NPV per hectare above 17 thousand reais, which shows a positive return even considering the capital devaluation over time. The index that relates benefit at cost greater than 1 and the additional return on investment greater than zero also shows the viability of the business.

Table 7: Indicators of economic-financial return on the cultivation of the Brazos blackberry

Indicator	Value
Present Value (VL)	BRL 129,624.99
Net Present Value (NPV)	BRL 78,392.19
NPV ha/year (VPLa)	BRL 17,117.29
Benefit/Cost Index (IBC)	1.45
Additional Return on Investment (ROIA)	7.70%

Source: Authors (2021)

As for the cash flow, a low investment need is analyzed, since in addition to the initial investment, the cash projection shows a need slightly higher than 10 thousand reais, with a peak in the twenty-third month, where in the subsequent month there is already a revenue of R $58,500.00, amortizing a large part of the investment, leaving a negative cash flow of R$3,190.80. The maintenance of the third year leaves a cash balance with a negative peak in the 35th month at R$11,038.80, which is followed by the second income entry that brings the final payback of the investment.

As for the investment risk indicators, considering the same parameters as above, we have values that indicate an acceptable investment risk, as explained in Table 8.

The internal rate of return (IRR), as well as the TMA/TIR index, stand out positively. The simple and discounted payback - where the devaluation of capital over time is discounted - bring equal values due to the particular characteristic of an inflow of income concentrated in an annual receipt. Business risk considering internal and external factors is considered low. Greater attention is given to management risk, in particular to marketing aspects.

Table 8: Brazos blackberry production risk indicators

Indicator	Value
Internal Rate of Return (IRR)	86.22%
TMA/TIR Index	0.03

Simple Payback (months)	36
Discounted Payback (months)	36
Business Risk	0.26
Management Risk	0.58

V. Conclusion

It is considered with this study that the culture of blackberry, especially the Brazos variety, adapts to the conditions of the northern plateau region of Santa Catarina.

Although the maintenance of the crop must be carried out throughout the year as it is a perennial crop and requires care for agroecological management, even so the cost and effort for the harvest, which is only 60 days, still has higher amounts. This concentration also facilitates cash flow, as revenues are also concentrated close to harvest.

As for the return, the values of the positive viability indices and a quick return for a perennial crop, with payback in 3 years, can be noted. As for the risk indicators, aspects favorable to culture are also considered, with special attention to the risk of the marketing issue, since the characteristic of the variety under study is focused more on fresh consumption, the market can be restricted and logistics a limiting factor. of marketing possibilities.

Finally, the economic and financial viability of the crop in the region is concluded, especially in small properties, but due to marketing and logistics issues, the scale can be compromised given the difficulty of negotiating large quantities and a possible degradation of revenues with the destination to industry, which offers lower remuneration than in natura sales.

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