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COST FOR IMPLEMENTATION OF GRAPE CROP IN THE NORTH CATARINENS PLANE AND RETURN PROSPECTS: COMPARING ESPALDEIRA AND MANGER SYSTEM

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ABSTRACT

The present study analyzes the production costs and the expectations of return on investment and the risks associated with the cultivation of grapes comparing two driving systems, cultivated in the region of the North Plateau of Santa Catarina, the espalier system with an approximate production of 800 boxes of 10 kg per hectare of Niagara Branca or Niagara Rosada grapes, and the manger system with an approximate production of 2000 boxes of 10 kg per hectare of the same type of grape. Both with five-year production cycles. This is an applied research in terms of its nature, descriptive in terms of its objective and a case study in terms of the strategy for approaching the problem. The information and data collected through documental research and semi-structured interviews were systematized in a cash flow projected in the respective terms, from an AMR of 6% pa. The Multi-Index Methodology was used to analyze the return and risks involved. From the results found, Monte Carlo simulation was used, through the Crystal Ball software, which point out that the average NPV of the 700m³/ st / ha option for 14 years exceeds the 420 m³ / st / option by R$16,869.00. for 7 years, the same occurring with IRR/average at 4.76% and ROIA/average at 3.46%. Although the results of the two varieties studied can be considered satisfactory, showing that the choice of one option over the other will depend on the opportunity presented in relation to reapplication of the gain, the values found show that the grape cultivation strategy by the manger driving presents a higher return to the investor.

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INTRODUCTION

The Planalto Norte Catarinense is an area of great potential for grape growing due to its temperate climate. Grape production, both for sale in natura and for the production of other derivatives, such as juices, wines, raisins, has grown to meet market demands. Fruit growing is a permanent crop, which is an excellent option for the small farmer, and family labor can be used, providing an attractive income even on small properties. Grape cultivation is influenced by the Italian colonization in our region, with several species being cultivated . However, the main species of cultivated grape is Niagara, because it can be produced in small areas, is easy to handle, has a lower production cost and is well accepted by consumers. The present work brings a theoretical reference, the methodology, the presentation of the results where the costs involved will be detailed to subsidize the rural producer with information that can help in the decision making regarding the type of production system to adopt to implement his enterprise. Considering the business potential that grape growing can represent for the region, as a way of diversifying cultures and promoting income generation, the following question is asked: What is the best cost-benefit alternative in terms of risk and return in the planting, to be implemented on a small property, according to the farmer's profile, and the property's characteristics?

THEORETICAL FRAMEWORK

Viticulture is the science that studies the production of grapes, whether for fresh consumption, winemaking and raisin production. The grape can be grown in places where the environmental conditions are favorable. In Brazil it is possible to grow grapes in practically the entire territory. According to Giovannini (2014) , the southern region of Brazil has a not very suitable climate, due to excess atmospheric

humidity, however, by adopting appropriate cultural practices, high quality production can be achieved. According to IBGE data, in 2019, the grape was produced in 19 states of Brazil, with the state of Santa Catarina, occupying the 5th place, producing 58,975 tons.

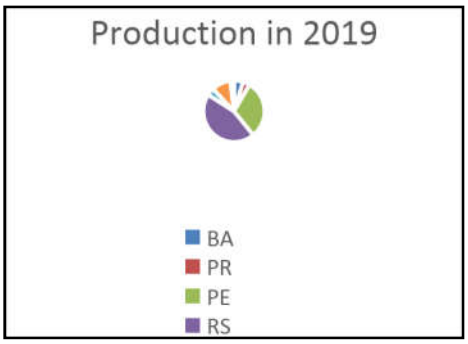


Figure 1. Data IBGE source adapted by the authors. year 2021

According to Lombardo (2009), the first grape seedlings planted by Italian immigrants who arrived in Santa Catarina, in 1878, in the Urussanga region, are responsible for the beginning of Santa Catarina viticulture as we know it today. Viticulture is a long-term investment, requiring prior planning, in which some preconditions must be evaluated, such as: economic viability, climate, region, culture history in the region, physical and chemical adequacy of the soil, availability of water and nutrients.

According to Giovaninni (2014), before planting a vineyard, the following questions should be considered:

- Will the new vineyard be economically viable?
- Is the climate suitable for the chosen vine cultivar?
- Will the soil support a healthy vineyard?
- Is there enough good quality water for phytosanitary treatments and perhaps irrigation in the first year?
- Have previous cultures at this location been successful?
- Are there biological problems at this location?

Knowing the cost structure of the production process, identifying them in the process, and still being able to analyze them separately or inserted in the production structure and, thus, being able to define actions that guide the adequate use of resources that are financing these shorts, is fundamental for decision making (GONÇALVES, 2002). Therefore, when the producer needs to make a decision on what to produce, he needs to have prior knowledge of the entire production chain, the costs involved, and the return he can have on his investment. “Organizations only perpetuate themselves if their prices are higher than their costs; the consumer only acquires these products when he perceives an added value superior to its price” (GUIMARAES NETO, 2008). This goes for any venture.

Stages of vine implantation: The separation of the phases of the production process brings several benefits to the administration (santos, 2002). In this way, the steps for planting grapes follow below.

Planting Season: In regions with well-defined seasons, as is the case in southern Brazil, the best time is between late July and early October, avoiding the risk of late frost.

Choice of growing area: According to Silveira (2011), the area must have a slightly inclined topography, if the chosen area is flat, drains must be installed before planting. It should be close to a source of quality water, periodically evaluating its quality, to facilitate irrigation in the dry season. Areas close to sewage or other potentially harmful substances should be avoided. Care should be taken to acquire virus-free seedlings.

Area preparation: The preparation of the area, as reported by Silveira (2011), consists of stump cutting, mowing, application of limestone and fertilizer, plowing , harrowing for subsequent opening of holes or furrows. Considering that the grape is a permanent crop, this is the best time to provide an adequate soil correction.

Demarcation of Land: When demarcating the land, it must be divided into smaller areas, also called plots, whose dimensions vary according to the characteristics of each location and its convenience, and it is not always possible to give the shape of a square or triangle. The plots must be separated by internal roads, which facilitate the movement of people, machines, transport of inputs and the flow of production.

Ground correction: After meeting the requirements reported, analyzes of the soil, chemical and physical, and of the water source must be carried out.
The application of fertilizers through irrigation, also known as fertigation , is a technology not yet applied by the producer participating in the research. The use of this technology can be a way to increase the efficiency of fertilization (PIRES et. Al., 2011), and the management system of the vine, with labor savings.

Spacing: It should have a spacing of 1 to 1.5m between plants and 2 to 2.5m between rows. According to Silveira (2011), the excessive reduction of spacing can compromise the quality of production, resulting in a decrease in the load of buds per plant.

Opening and fertilizing the pits: The hole must be large enough to hold the seedling's root system up to the height of its neck (point of union between the roots and the stem). The minimum dimensions are 50 x 50 x 50 cm. The filling of the holes must be done with a mixture of soil, organic matter and fertilizers related to the fertilization of the vineyard implantation, in the recommended amounts according to the soil analysis. It is important to point out that, at the time of planting, the height of the seedling neck must be 5 cm above the ground level, because after completing the planting operation, the seedling must be irrigated with about 20 liters of water, which usually causes a lowering of the seedling due to the displacement of the air present in the soil by the action of the water. Finally, a stake must be placed next to the seedling and tied with a string, so as not to hurt the plant (SILVEIRA, 2011).

Acquisition of seedlings: The producer has two options to obtain the vine seedlings: buy it ready-made or produce it on his property. In the first case, in order to guarantee genetic quality and phytosanitary health, seedlings must be purchased from a suitable nursery, certified and inspected by the Department of Agriculture and licensed by Embrapa. To define the cultivars to be used, the producer can seedlings resistant to the main pests and diseases of each region and adapted to the soil conditions of each region. If the seedling is produced on the property, the multiplication material (buds and cuttings) must be collected from matrices with good vigor and sanitary status, free from fungi and pests. The mother plant must present good productivity and uniform maturation of the grapes. These seedlings are for use on the property and cannot be sold. The seedling takes around a year to be ready for planting (SILVEIRA, 2011).

Pruning: Two annual pruning should be performed. Short pruning, the most used, is indicated for cultivars such as Bordô and Isabel. Mixed pruning is a requirement of cultivars such as Niágara Rosada and Branca and of cultivars launched by Embrapa. Pruning serves to maintain the balance between the vigor of the vegetation and fruiting.

Plant formation: From 30 to 45 days after planting, sprouting begins. From this moment on, the producer must take care of his driving.

Harvest: The ideal time for harvesting is in the morning, avoiding the hottest hours. Manual harvesting should be preferred over mechanical, in order to guarantee the integrity of the bunches.

Multi-Index Methodology: Multi-Index Methodology was proposed by Souza and Clemente (2004), used for investment decisions in real

assets, where it uses two different groups of indicators to assess the expectations of return and risk perception respectively of a certain investment. The first group is represented by the Net Present Value (NPV), Updated Net Present Value (NPPV), Benefit-Cost Ratio and Additional Return on Investment (ROIA). The second group seeks to represent, on a scale from zero to one, the perception of risks related to the project under analysis, consisting of: Minimum Rate of Attractiveness/Internal Rate of Return (AMR/IRR) as a proxy for P (NPV≤ 0); Payback Ratio /N as a proxy for the Risk of Non-Recovery of Invested Capital; Revenue Commitment Degree (GCR) to represent Operational Risk; Management Risk and Business Risk.

PROPERTY CONTEXTUALIZATION

The property object of this study is located in the countryside of Papanduva - SC. Distant about 12 km from the municipality's headquarters. It has 27 hectares, its own area, where the couple and two sons live, one aged 23 and the other aged 19. Considered a small rural property with good structure, with a masonry house with electricity, artesian well and piped water, in addition to a smokehouse, corral, shed and other improvements. Tobacco growing area 6 hectares, 15 hectares of pastures where an average of 35 adult bovine animals are raised, and 3 hectares for grape production. Every 2 years, the producer performs soil analysis, where soil samples are collected and sent to the laboratory. As a result of this analysis, the producer acquires the products necessary for soil correction, where he receives guidance and technical support from a specialized professional. The main species of grapes grown are White Niagara and Pink Niagara. This is a good choice of species for those who are starting in this segment, due to the ease of cultivation, and the good acceptance in the market, whose sale value is around R$ 5.00 per kg. Other interesting species for cultivation are Isabel precocious and on board, special for juices, sold at R$ 4.00 per kg. Vitória and Isis (table) grapes have a higher added value, and are sold at around 7.00 kg and can be a good alternative for those who want to expand their cultivation. The need to increase the gross income of the property and the search for alternatives to reduce tobacco plantations, which is an activity that is highly harmful to the health of workers, made him opt for the possibility of continuing with the investment.

Source: authors 2021

Figure 2. Niagara Grape - Manger System

Driving Systems The producer of the property object of this study concentrates most of his production of Niágara Branca and Niágara Rosada grapes, in the Y or Manjedoura driving system. The vineyard occupies 3 hectares, producing 60,000 kg of grapes per year. All production is marketed.

Manger or Y System: Manger conduction system is an improvement of the espalier system, both for wine and table grapes, as the shoots that are born from the single spur cord are separated, opening the foliage, which forms a ventilation channel inside it, providing protection from the bunches against the sun's rays, facilitating access during spraying (SOUZA,1996). In the Manjedoura system, if there is no weather, the producer is able to obtain a production of 2000 boxes of grapes (10 kg), obtaining an annual income of R$ 100,000.00.

Table 1. Production and sales revenue of Niagara grapes in the Manjedoura System

Venda UVAS - 1 hectare - aproximadamente 2000 caixas SISTEMA Y OU MANJEDORA				
Descrição	Especificação	Valor unitário	Quantidade	Valor Total (R$)
		(R$)	Caixas	(R$)
CAIXA UVA	Caixa 10Kg	50,00	2000	100.000,00
	TOTAL			

Source: authors/2021

With the help of Epagri, we prepared spreadsheets with the necessary material, and the costs for implementing the grape culture in the Y or Manjedoura system and a comparison with the Espaldeira system:

Table 2. Cost with material for the implementation of the Manjedoura system grape culture

1º ANO DE IMPLANTAÇÃO DA CULTURA DE UVA SISTEMA EM Y					
CUSTO DE IMPLANTAÇÃO					
DESCRIÇÃO	QUANTIDADE	VALOR (R$)		TOTAL (R$)	
Poste de eucalipto tratado 2.70 m x 10 a 12 cm	528,00	R$	29,00	R$	15.312,00
Poste de eucalipto tratado 2.70 m x 12 a 15 cm	66,00	R$	35,00	R$	2.310,00
Poste de eucalipto tratado 2,00 m x 15 a 17 cm (Rabicho)	66,00	R$	19,00	R$	1.254,00
Poste de eucalipto tratado 2,00 m x 8 a 12 cm	66,00	R$	14,00	R$	924,00
Barrote de Eucalipto tratado - serrada 1,50 x 5 x 10	1.782,00	R$	11,50	R$	20.493,00
Conjunto parafuso porca para fixar travessas	1.188,00	R$	1,90	R$	2.257,20
Parafuso frances 12 cm com polca 8,0 mm	1.188,00	R$	1,60	R$	1.900,80
Arame galvanizado 600 kgf - fio base (110 m por fila)	4.000,00	R$	0,43	R$	1.720,00
Arame liso 500 kgf - 8 fios por fila (880 m por fila)	29.000,00	R$	0,37	R$	10.730,00
Tensionador para arame liso 2,0 a 3,25 mm	300,00	R$	7,80	R$	2.340,00
Maquinas				R$	2.500,00
SUBTOTAL				R$	61.741,00
SISTEMA DE IRRIGAÇÃO					
Tubo gotejador emissor 30 cm	3.630,00	R$	1,95	R$	7.078,50
Cano pvc 50mm BARRA	17,00	R$	31,50	R$	535,50
Conector tudo gotejador	33,00	R$	5,00	R$	165,00
Filtro	1,00	R$	255,00	R$	255,00
Conecções cano	1,00	R$	147,00	R$	147,00
SUBTOTAL				R$	8.181,00
DESCRIÇÃO	QUANTIDADE	VALOR (R$)		TOTAL (R$)	
MÃO DE OBRA INSTALAÇÃO		R$	19.500,00	R$	19.500,00
SUBTOTAL				R$	19.500,00
TOTAL				R$	89.422,00

Source: authors/2021

The biggest investment is with the posts and wires. The irrigation system is necessary to obtain greater productivity, it is done by dripping and must be installed at a certain height so that machinery can be used without risk of damage.

Espalier driving system: According to the Embrapa manual, vines conducted in espaliers have a vertical vegetative canopy and pruning can be mixed or in a spur cord . The vines are planted vertically, in parallel rows. The main advantages of this planting method are that they produce high quality grapes, where the bunches are better exposed to the sun, thus reducing humidity, allowing better ripening.

Table 3. Grape production in the espaldera

Venda UVAS - 1 hectare - aproximadamente 800 caixas SISTEMA ESPALDERA				
Descrição	Especificação	Valor unitário	Quantidade	Valor Total (R$)
		(R$)	Caixas	(R$)
CAIXA UVA	Caixa 10Kg	50,00	800	40.000,00
	TOTAL			

Source: authors/2021

Regardless of the chosen conduction system, the amount of seedlings planted is the same, so after having assembled the entire support structure of the vines, the costs for soil preparation for both systems are shown below:

Table 4. Cost with material for implantation of the cultivation of Grape espalier system

1º ANO DE IMPLANTAÇÃO DA CULTURA DE UVA SISTEMA ESPALDERA
CUSTO DE IMPLANTAÇÃO

DESCRIÇÃO	QUANTIDADE	VALOR (R$)	TOTAL (R$)
Poste de eucalipto tratado 2 70 m x 10 a 12 cm (Meios)	528,00	R$ 29,00	R$ 15.312,00
Poste de eucalipto tratado 2 70 m x 12 a 15 cm (Cabeçera)	66,00	R$ 35,00	R$ 2.310,00
Poste de eucalipto tratado 1 20 m x 15 a 17 cm (Rabicho)	66,00	R$ 19,00	R$ 1.254,00
Cordoalha para rabicho 3 fios (4.0 mt por fila)	66,00	R$ 5,20	R$ 343,20
Tensionador de arame liso 2,0 a 3,25 mm	33,00	R$ 8,50	R$ 280,50
Tensionador de arame liso 2,0 a 3,25 mm	132,00	R$ 8,10	R$ 1.069,20
Arame galvanizado 600 kgf (ho base 1 por fila - 110 mt)	4.000,00	R$ 0,43	R$ 1.720,00
Arame galvanizado 500 kgf (Foliar duplo - 3 por fila - 660 mt)	22.000,00	R$ 0,37	R$ 8.140,00
Maquinas			R$ 2.500,00
SISTEMA DE IRRIGAÇÃO			
Tubo gotejador emissor 30 cm	3.630,00	R$ 1,95	R$ 7.078,50
Cano pvc 50mm BARRA	17,00	R$ 31,50	R$ 535,50
Conector tudo gotejador	33,00	R$ 5,00	R$ 165,00
Filtro	1,00	R$ 255,00	R$ 255,00
Conecções cano	1,00	R$ 147,00	R$ 147,00
SUBTOTAL			**R$ 41.109,90**
DESCRIÇÃO	**QUANTIDADE**	**VALOR (R$)**	**TOTAL (R$)**
MÃO DE OBRA INSTALAÇÃO		R$ 19.500,00	R$ 19.500,00
SUBTOTAL			**R$ 19.500,00**
TOTAL			**R$ 60.609,90**

Source: authors /2021

Table 5. Cost with soil preparation for the implementation of Grape Culture 1st year

1º ANO DE IMPLANTAÇÃO DA CULTURA DA UVA
SERVIÇOS

DESCRIÇÃO		QUANTIDADE	VALOR (R$)	TOTAL (R$)
Limpar área	HM	10,00	130,00	1.300,00
Subsolagem cruzada	HM	16,00	130,00	2.080,00
Aração	HM	4,00	130,00	520,00
Gradagem	HM	4,00	130,00	520,00
Aplicar calcário	HM	6,00	130,00	780,00
Aplicar adubo	HM	2,00	130,00	260,00
Assistência técnica	H	18,00	60,00	1.080,00
Plantar	H	132,00	9,80	1.293,55
Tutorar	H	48,00	9,80	470,38
Implantar a sustentação	H	384,00	9,80	3.763,06
Combater formiga	H	64,00	9,80	627,18
Roçada	HM	20,00	130,00	2.600,00
Tratamento fitossanitário	H	40,00	9,80	391,99
Esladroar e amarra	H	40,00	9,80	391,99
TOTAL				**16.078,15**

Source: authors /2021

Below, we list the costs of the seedlings, and the inputs used in planting and in the first year:

Table 6. Cost of Inputs for the implementation of the Grape culture Manjedoura system 1st year

1º ANO DE IMPLANTAÇÃO DA CULTURA DA UVA
INSUMOS

DESCRIÇÃO	QUANTIDADE	VALOR (R$)	TOTAL (R$)
MUDAS Cavalo	1.667,00	R$ 9,15	R$ 15.253,05
Calcario	15,00	R$ 130,00	R$ 1.950,00
Cama de aves	7.000,00	R$ 0,12	R$ 840,00
Ureia	111,00	R$ 1,60	R$ 177,60
Defensivos	3,00	R$ 95,00	R$ 285,00
SUBTOTAL			**R$ 18.505,65**
TOTAL			**R$ 124.005,80**

Source authors /2021

Table 7. Soil preparation cost for implantation of the Manjedoura System Grape Culture 2nd year

2º ANO DE IMPLANTAÇÃO DA CULTURA DE UVA
INSUMOS

DESCRIÇÃO	QUANTIDADE	VALOR (R$)	TOTAL (R$)
CLORETO DE POTASSIO	-	R$ 1,90	R$ -
SUPERFOSFATO TRIPLO	-	R$ 1,90	R$ -
URÉIA	111,00	R$ 1,60	R$ 177,60
DEFENSIVOS	10,00	R$ 95,00	R$ 950,00
SUBTOTAL			**R$ 1.127,60**
TOTAL 2º ANO			**R$ 7.553,49**

Source: authors/2021

Table 8. Cost of Inputs for the implementation of the Manjedoura system grape crop in the 2nd year

2º ANO DE IMPLANTAÇÃO DA CULTURA DE UVA
INSUMOS

DESCRIÇÃO	QUANTIDADE	VALOR (R$)	TOTAL (R$)
CLORETO DE POTASSIO	-	R$ 1,90	R$ -
SUPERFOSFATO TRIPLO	-	R$ 1,90	R$ -
URÉIA	111,00	R$ 1,60	R$ 177,60
DEFENSIVOS	10,00	R$ 95,00	R$ 950,00
SUBTOTAL			**R$ 1.127,60**
TOTAL 2º ANO			**R$ 7.553,49**

Source: authors / 2021

Table 9 - Soil preparation cost for the implementation of the Manjedoura System Grape Crop 3rd year

3º ANO DE IMPLANTAÇÃO DA CULTURA DOA UVA
PREPAROS E TRATOS CULTURAIS

DESCRIÇÃO		QUANTIDADE	VALOR (R$)	TOTAL (R$)
Aplicar adubo	HM	2,00	R$ 130,00	R$ 260,00
Combater Formiga	H	64,00	R$ 9,80	R$ 627,18
Tratamento Fitossanitário	HM	6,00	R$ 130,00	R$ 780,00
Eliminar brotação	H	16,00	R$ 9,80	R$ 156,79
Assistência Técnica	H	18,00	R$ 60,00	R$ 1.080,00
Poda de Inverno	H	64,00	R$ 9,80	R$ 627,18
Roçar	HM	9,00	R$ 130,00	R$ 1.170,00
Colher	H	48,00	R$ 9,80	R$ 470,38
SUBTOTAL				**R$ 5.171,53**

Source: authors //2021

Table 10. Cost of Inputs for the implementation of the Manjedoura system grape crop in the 3rd year

3º ANO DE IMPLANTAÇÃO DA CULTURA DA UVA
INSUMOS

DESCRIÇÃO	QUANTIDADE	VALOR (R$)	TOTAL (R$)
CLORETO DE POTASSIO	33,00	R$ 1,90	R$ 62,70
SUPERFOSFATO TRIPLO	53,00	R$ 1,90	R$ 100,70
UREIA	156,00	R$ 1,60	R$ 249,60
DEFENSIVOS	20,00	R$ 95,00	R$ 1.900,00
DESPESAS COM EMBALAGEM E MATERIAIS PARA COLHEITA	1,00	R$ 850,00	R$ 850,00
SUBTOTAL			**R$ 3.163,00**
TOTAL			**R$ 8.334,53**

Source: authors/2021

Table 11. Soil preparation cost for the implementation of the Grape Culture Manjedoura System 4th year

4º ANO DE IMPLANTAÇÃO DA CULTURA DA UVA
PREPAROS E TRATOS CULTURAIS

DESCRIÇÃO		QTDE HORAS	VALOR (R$)	TOTAL (R$)
Aplicar herbicida	HM	4,00	R$ 130,00	R$ 520,00
Poda de Inverno	H	280,00	R$ 9,80	R$ 2.743,90
Poda verde	H	80,00	R$ 9,80	R$ 783,97
Aplicar adubo	HM	2,00	R$ 130,00	R$ 260,00
Combater Formiga	H	64,00	R$ 9,80	R$ 627,18
Tratamento Fitossanitario	HM	4,00	R$ 130,00	R$ 520,00
Assistência Técnica	H	18,00	R$ 60,00	R$ 1.080,00
Roçar	HM	10,00	R$ 130,00	R$ 1.300,00
Colher	H	240,00	R$ 9,80	R$ 2.351,92
SUBTOTAL				**R$ 10.186,97**

Source: authors/2021

Table 12. Cost of Inputs for the implementation of the Manjedoura system grape crop in the 4th year

DESCRIÇÃO	QUANTIDADE	VALOR (R$)	TOTAL (R$)
CLORETO DE POTASSIO	65,00	R$ 1,90	R$ 123,50
SUPERFOSFATO TRIPLO	105,00	R$ 1,90	R$ 199,50
UREIA	111,00	R$ 1,60	R$ 177,60
DEFENSIVOS	20,00	R$ 95,00	R$ 1.900,00
DESPESAS COM EMBALAGEM E MATERIAIS PARA COLHEITA	1,00	R$ 1.700,00	R$ 1.700,00
SUBTOTAL			**R$ 4.100,60**
TOTAL			**R$ 14.287,57**

Source: authors/2021

Table 13 . Soil preparation cost for the implementation of the Grape Culture Manjedoura System 5th year

5º ANO DE IMPLANTAÇÃO DA CULTURA DOA UVA
PREPAROS E TRATOS CULTURAIS

DESCRIÇÃO		QUANTIDADE HOF	VALOR (R$)	TOTAL (R$)
Aplicar herbicida	HM	4,00	R$ 130,00	R$ 520,00
Poda de Inverno	H	280,00	R$ 9,80	R$ 2.743,90
Poda verde	H	80,00	R$ 9,80	R$ 783,97
Aplicar adubo	HM	2,00	R$ 130,00	R$ 260,00
Combater Formiga	H	64,00	R$ 9,80	R$ 627,18
Tratamento Fitossanitario	HM	4,00	R$ 130,00	R$ 520,00
Assistência Técnica	H	18,00	R$ 60,00	R$ 1.080,00
Roçar	HM	10,00	R$ 130,00	R$ 1.300,00
Colher	H	280,00	R$ 9,80	R$ 2.743,90
SUBTOTAL				**R$ 10.578,95**

Source: Authors/2021

Table 14. Cost of Inputs for the implementation of the Manjedoura system grape crop in the 5th year

5º ANO DE IMPLANTAÇÃO DA CULTURA DA UVA
INSUMOS

DESCRIÇÃO	QUANTIDADE	VALOR (R$)	TOTAL (R$)
CLORETO DE POTASSIO	98,00	R$ 1,90	R$ 186,20
SUPERFOSFATO TRIPLO	158,00	R$ 1,90	R$ 300,20
UREIA	111,00	R$ 1,40	R$ 155,40
DEFENSIVOS	75,00	R$ 95,00	R$ 7.125,00
DESPESAS COM EMBALAGEM E MATERIAIS PARA COLHEITA	1,00	R$ 1.700,00	R$ 1.700,00
SUBTOTAL			**R$ 9.466,80**
TOTAL			**R$ 20.045,75**

Source: Authors/2021

From the second year onwards, there will only be costs of preparation and cultural treatments and inputs. If the producer was very careful with the stages of implantation, choice of seedlings and if the climate is favorable, he will be able to have an excellent production in the second year. Expenses with inputs and soil correction tend to increase gradually each year, due to the need to keep the soil in an adequate condition for the development of grapes.

RESULTS AND DISCUSSION

Both driving systems are used in the region, however, according to the results of the study, in the Manjedoura system, production can exceed 150% in relation to the espalier system.

GRAPE SPALDER SYSTEM			
MONTH	DISBURSEMENT	REVENUE	CASH FLOW
1st YEAR	95,193.70	-	-95,193.70
2nd YEAR	6,550.36	40,000.00	33,449.64
3RD YEAR	8,456.00	40,000.00	31,544.00
4th YEAR	15,427.40	40,000.00	24,572.60
5th YEAR	20,190.00	40,000.00	19,810.00

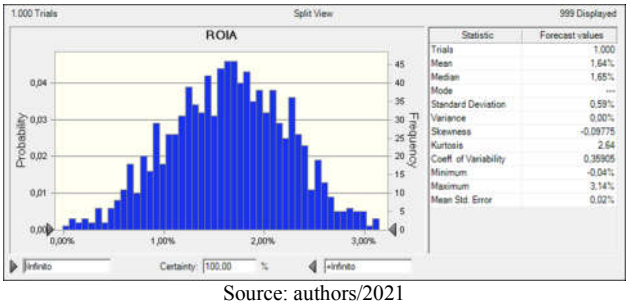
Source: authors/2021

Table 16 - Manjedoura system cash flow

GRAPE AND MANGER				
MONTH	DISBURSEMENT	REVENUE		CASH FLOW
1st YEAR	106,206.75	-		**- 106,206.75**
2nd YEAR	6,650.36	100,000.00		**93,349.64**
3RD YEAR	7,018.98	100,000.00		**92,981.02**
4th YEAR	12,448.94	100,000.00		**87,551.06**
5th YEAR	17,080.91	100,000.00	**82,919.09**	

Source: authors/2021

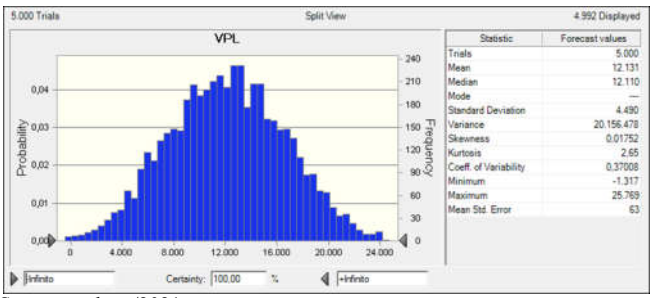
In the espalier system, you start to have a return on invested capital only in the fourth year, as shown in table 14. In the manger system, the initial investment is much higher, however, the productivity, considering the better use of space, is considerably greater. In the third year of production, it is already starting to make a profit, exponentially. Below, the return and risk indicators demonstrate the comparison between the types of production:



Source: authors/2021

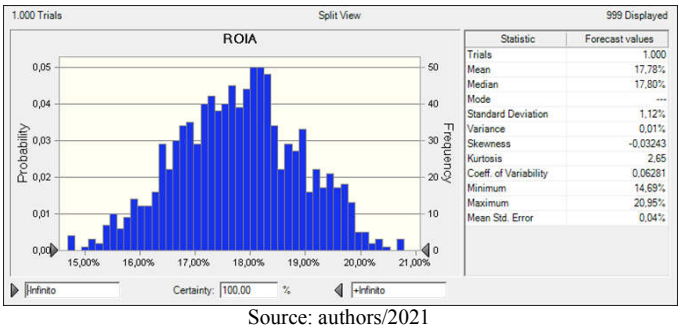
Figure 3. Roia espaldera grape spalder system

The application of Crystal ball by the Monte Carlo simulation, confirms the data found.



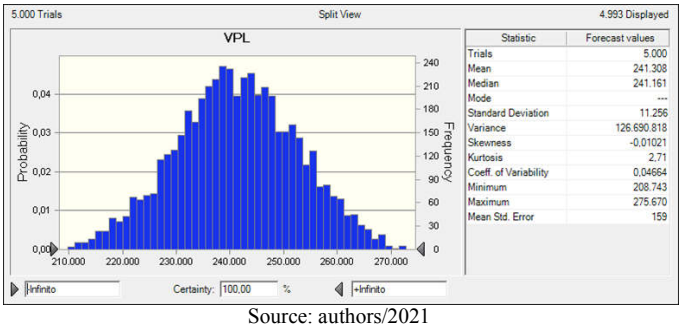
Source: authors/2021

Figure 4 - ESPALDERA NAV



Source: authors/2021

Figure 5. Roia Manjedoura Grape And Manger



Source: authors/2021

Figure 6 - NPV MANGER

CONCLUSION

Grape cultivation in Planalto Norte Catarinense can be a good alternative for farmers looking for diversification, especially for small rural producers. The price of fresh grapes sold in the region is higher than those produced in large grape production centers, and all the grapes produced are marketed. Knowing the costs involved to implement a new production system is essential for the producer to be aware of the necessary investment, and the return period of this investment. Formal methods of indicators in investment decisions is one of the ways of classifying investments in terms of risk and return, as they provide more accurate subsidies to producers. According to the research results, the use of the Multi-index methodology , together with the indicators of analysis and evaluation of return on investment and associated risks, help rural producers in decision making, providing satisfactory results to their investments. The results obtained in this work prove that in the espalier system, the investment for implementation is lower, it is an easier system to handle, but with lower returns. In the manger system, a greater investment is necessary, but the return on this investment is considerably greater due to the better use of space. Another method of vine management that has good productivity and profitability due to the quality of the fruits is the trellis system, which we leave as a suggestion for further studies and deepening.

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