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Application of Cost, Risk and Return Management Indicators: A Contribution to Determining Temporary Soy, Maize and Wheat Crops

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***Abstract*—** *The abstract should summarize the content of the paper. Try to keep the abstract below 250 words. Do not make references nor display equations in the abstract. The journal will be printed from the same-sized copy prepared by you. Your manuscript should be printed on A4 paper (21.0 cm x 29.7 cm). It is imperative that the margins and style described below be adhered to carefully. This will enable us to keep uniformity in the final printed copies of the Journal. Please keep in mind that the manuscript you prepare will be photographed and printed as it is received. Readability of copy is of paramount importance.*

I. INTRODUCTION

The evolution in several market branches has been expanding daily, where globalization and competitiveness are increasingly gaining strength with high technologies, thus requiring innovations and transformations in several areas. In view of this reality, Brazilian agribusiness stands out with an important relevance, being one of the main sources of income in the country, making the agricultural sector a broad labor and development market, moving millions of financial units worldwide and with great productive potential, aiming meet various global needs. With this, the producer has reached high levels of production and positive profitability.

In this way, even with positive results, many farmers do not have a control, even simple so that they are able to ascertain, execute, predict and control the activities performed, since the use of control and the management of the property, be it small, medium or large, it is considered a factor of great satisfaction for an efficient decision making, with tools for the administration of its products, enabling knowledge about seasonality and future markets, seeking ways to reduce its costs and waste, thus obtaining information about its products. , production and results. In most cases the farmer grows different temporary crops, with different harvests and consequently with different costs,

In this article, the topic "Cost analysis in agribusiness, a comparison of temporary soybean, corn and wheat crops" was addressed with the objective of assisting financial and production control in relation to their annual harvests, proposing a comparison of products , so that it is easy to see in which culture the best result is obtained in relation to costs, resulting in an essential

method for the administration of the rural property that provides information that supports decision making, improving the economic and financial performance of the activity agricultural.

II. THEORETICAL FRAMEWORK

Agricultural properties can be defined as true rural companies, which, like any other company, need materials, need financial resources, labor, improvement for their survival and their ultimate goal is to obtain profit, these factors influence directly in its products and services, which are combined with knowledge of the production and operations of the property.

According to CREPALDI, (1998, p. 22):

Knowledge of market conditions and natural resources gives rural producers the basic elements for the development of their economic activity. It is now up to him to decide what, how much and how to produce, control the action after starting the activity and, finally, evaluate the results achieved and compare them with those initially planned.

The agricultural producer must choose ways to reduce his costs and waste without jeopardizing his productivity, in order to improve the planning and control of his activities, obtaining information about his production, products and results. Thus, it is necessary to analyze the cost of your product where it allows the planning, control, evaluation and verification of which culture will have the best result in relation to its costs. Following is a theoretical framework on costs in agricultural activity, agricultural accounting and agricultural costs.

2.1 BRAZILIAN AGRIBUSINESS

Agricultural activity represents the activity of land exploration, which has been expanding year by year, mainly with the implementation of new production technologies and controls, which is characterized by the high demand for food necessary for survival in a world context, which is fundamental importance for the country's development.

According to MARION, (2006, p. 2):Rural activities are those that exploit the productive capacity of the soil through cultivating the land, raising animals and transforming certain agricultural products. Rural companies can be divided into three types, being companies that carry out agricultural activity, those that carry out zootechnical activity, and even those that carry out agro-industrial activity.

Agricultural activity encompasses two types of crops, the temporary ones which are those that are subject to replanting after harvest, having a short life span in their production process, and also the permanent ones, which are those that are not subject to replanting after harvesting. the harvest, this crop provides more than one harvest or production.

For the administrator of the rural property, it is of utmost importance to know the crop cycle in order to have an efficient and effective control and planning for its production, as well as the correct period for planting, fertilization, spraying and management, in order to achieve a good profitability and profitability.

2.1.1 Agricultural Product

In the region where the study is carried out, most cultures are temporary and the geographical and climatic conditions provide advantages to these cultures. The rural producer must have an in-depth knowledge of agricultural cultivation, for an efficient programming of his objectives for the next periods, aiming to respect the best forms of soil management in relation to different situations that occurred year by year. Among the three crops selected for analysis, the producer must make an advance schedule to select which ones will be grown in the next periods, based on a history and information obtained about the time, cost and future market:

a) Soy

According to the website of the Ministry of Agriculture (2019), soy is considered in Brazilian agribusiness, the product that had the greatest growth in the last three decades, is standing out in national agriculture and in the trade balance. Its cultivation is intended both for human consumption and for the manufacture of animal feed.

Fig.1: Soy cultivation

Source: Analyzed property, 2019/2020.

B) Corn

According to the website of the Ministry of Agriculture (2019), Brazil is the third largest world producer of corn, totaling 53.2 million tons in the 2009/2010 harvest. The first idea is the cultivation of grain to meet consumption on the table of Brazilians, but this is the smallest part of production. The main destination of the harvest is the animal feed industry.

Fig.2: Corn cultivation

Source: Analyzed property, 2019/2020.

C) Wheat

Wheat is considered globally as the second most produced cereal in the world, after corn, according to the Ministry of Agriculture (2019). In Brazil it is grown in the South, Southeast and Midwest regions, due to the climatic conditions not being so favorable for production, producers receive reinforcement from government agencies for planting. Wheat grain is used mainly as food and derived products, but it is also used for animal feed.

Fig.3: Wheat cultivation

Source: Analyzed property, 2019/2020.

2.2 AGRICULTURAL ACCOUNTING

Agricultural accounting applies to rural companies, it is the branch that aims to analyze the administration of crops and livestock, which are considered as those that are intended for the production of goods with their cultivation / management and commercialization, that is, it is defined with the objective of removing livelihood through land exploitation.

2.2.1 Agricultural Costs

Agricultural costs are part of the daily life of rural companies, as they record, collect and classify important data, whether monetary or not, both external and internal, bringing information to different levels of management in order to assist in decision-making.

According to MARTINS (2003, p. 21):

Cost Accounting has two relevant functions: assisting Control and assisting decision making. With regard to Control, its most important mission is to provide data for the establishment of standards, budgets and other forms of forecasting and, at an immediately following stage, to monitor what actually happened for comparison with previously defined values.

Among the various cost divisions, the cost of labor can be highlighted as highly relevant, and many producers want to account for this cost, for the reason that the production processes are performed by family members or themselves. Also highlighting the costs of materials and inputs that are accounted for as direct costs. In addition, the producer 's knowledge of the other costs listed below are of great importance for the financial success of the property.

The following are related to the division of agricultural costs:

a) Labor costs: Labor costs are related to all the people who work with the company. rural activity, regardless of the positions they occupy within the property.

The cost of labor can be divided into direct, which is defined as the work applied directly in the manufacture of the product, parts or components, or in the provision of services, where the cost of labor consists of wages, social charges and provisions for vacation and 13th salary, and indirect, which is represented by the work carried out in the auxiliary departments.

b) Costs with materials and inputs: It is defined as the materials and agricultural inputs produced or acquired by the company to be used during cultivation of the product, from the preparation of the soil to the sale of the product, are classified as all expenses and investments that contribute to the formation of a certain product or merchandise until final consumption.

Therefore, in the rural company, inputs are: seeds, fertilizers, pesticides, limestone, machines and implements, parts and fuels, which are essential for the

formation of crops, in which all are used in the production processes of selected crops.

c) Depreciation: Depreciation is defined as the reduction in the value of the goods due to wear or loss of utility due to use, action of nature or obsolescence, applied to tangible and intangible goods such as machinery, equipment, vehicles and improvements. Depreciation can occur for a variety of physical and economic reasons.

According to MARION, (2007, p. 43):

Agricultural implements such as tractors, harvesters, agricultural equipment, etc. they are not used uninterruptedly during the year (as industrial equipment normally is) due to off-season, rain, frost, idleness, etc. Accordingly, it is recommended that depreciation be appropriated as a result of the use of the respective cultures or projects. Hence the need to calculate depreciation per hour, estimating a number of hours of work per equipment, instead of the number of years of useful life.

One of the difficulties encountered is the exact calculation of the depreciation cost and useful life of the assets used in the agricultural activity, which can vary from equipment to equipment, and the depreciation of the machines is calculated by the hours worked, while the equipment and improvements by their working time. use.

d) Revenue and taxes: Gross revenue from rural activity consists of the amount of sales, with the deduction of taxes and costs listed above and from these results, the net result is obtained.

Funrural is calculated on the value of its sale, being 1.5% on the invoice value, which is a social contribution that must be paid by the rural producer as a percentage of the total value of his revenues, in addition to Funrural is also accounted for the ITR (Rural Territorial Tax), where a percentage is calculated on the exploitation of cultivated land.

Also highlighting the ICMS (Tax on the Sale of Goods and Services), as per annex 03 of RICMS / SC DEC 2.870 / 01, art. 4th the tax is deferred in the agricultural establishment when they are destined for commercialization or industrialization, for that the product must be in a natural state.

e) Cost of goods sold: The cost of goods sold includes all resources used in the production process of each crop, some of them may be affected by seasonal factors with changes in values. This cost is part of the income statement and it is directly related to profit or loss of property.

f) Result: For the rural producer, in addition to personal goals (productivity and product quality), there are financial objectives that are related to the final result of the harvest, which is the moment when the producer wants to know and check if the work it is giving satisfactory result, making a retrospective of the investment made, being able to optimize future processes.

They can be calculated from the profitability indexes that are related to the profit, that is, the result (profit or loss) obtained by the company. Profitability is the percentage of gain obtained on sales made, indicating what the company manages to generate on the work it develops.

The profitability that indicates the percentage of expected return on an investment must also be considered. To calculate profitability, in a new company or in an investmentto be carry outof, it is necessary to use the value of the capital applied. When it comes to an operating company, the value of the company's total equity can be used.

According to the Rrecipe Federal (2019),the result of rural activity, when positive, will be included in the income tax calculation base for the annual declaration, in its calculation, revenues, expenses and investments are computed monthly on a cash basis. The result of the rural activity performed by the individual is determined through the bookkeeping, covering the revenues, expenses, investments and other values that integrate the activity.

III. METHODOLOGY

This study, as to its degree of presentation, reveals itself as applied research, since it is directed to the solution of specific problems, presenting a descriptive character, with the purpose of describing, interpreting and analyzing data on production costs, expectations of costs in the agribusiness of the temporary crops in the cultivation of soy, corn and wheat.

As for the approach to the problem, it was configured as quantitative. According to BEUREN (2006, p. 92):

[...] the quantitative approach is characterized by the use of statistical instruments, both in the collection and treatment of data. This procedure is not so profound in the search for knowledge of the reality of the phenomena, since it is concerned with the general behavior of events.

The study is defined as quantitative, characterized by the use of statistical instruments, using mathematical resources for the solution and analysis of the data.

As for its temporality, it can be characterized as a cross-sectional nature, since the information considers a period of time, limited the scope of the research. The methodology used in this study has as a typology a case

study, for BEUREN (2006, p. 84) “it is noticed that this type of research is carried out in a more intensive way, due to the efforts of the researchers to concentrate on a certain study object". The research aims to inform the researcher about production costs, controls, values and behaviors related to the analyzed cases.

As for the methodological procedures, the research of this academic work was carried out through a survey, which comprises the research with the producer to obtain data on the production of temporary crops.

After collecting the documentary information, the total production costs were applied to a spreadsheet to assess profitability and profitability, after deducting costs and expenses. “In accounting, documentary research is used with some frequency, especially when it is desired to analyze the behavior of a certain sector of the economy, such as aspects related to the patrimonial, economic and financial situation” (BEUREN 2006, p. 90).

In this study, spreadsheets were used, using the EXCEL software to determine costs, the variable direct costing method was applied, according to MARION (2007). Aiming to compare the cost per hectare in relation to soy, corn and wheat products.

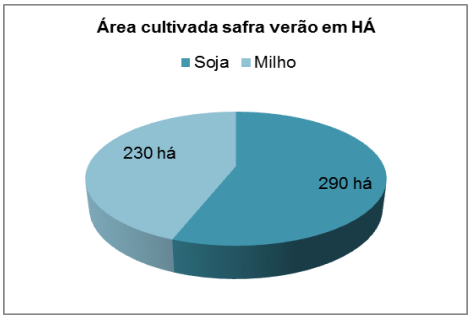
IV. DEVELOPMENT

This research is constituted in the analysis of the costs in the agricultural activity, starting with the development of a cost system applied to the rural property, looking for the formation of the total and unitary cost of the agricultural production of some selected products, making a comparison of which product has a better profitability and profitability for rural producers.

The object of study consists of a rural property, in which the activity exercised is the cultivation of temporary crops of soy, corn and wheat, based on the 2019/2020 crop year for data analysis.

4.1 PRODUCTION AREA

Based on information collected within the analyzed agricultural property, it was possible to survey the total cultivated area, with the selected items in the summer crops being soybeans and corn and in the winter culture wheat, totaling the areas of crops of summer on 520 hectares and winter crops on 140 cultivated hectares, as shown in the graphs below:



Graph 1 - Summer crop cultivated area

Source: From the authors, 2020.

According to Graph 1, of the total area of 520 hectares belonging to the property, it was found that in the crop year analyzed, 290 hectares of soybeans and 230 hectares of corn were cultivated.

Graph 2 - Winter crop area

Source: From the authors, 2020.

As shown in the graph above, in the winter harvest, 140 hectares of wheat are cultivated, so that, of the total area of the property, 380 hectares are free, in this area the oats are sown with the objective of rotating the soil and preventing pests from being created or remain for future harvests.

The property has an investment of R $ 19,760,000.00, referring to land, machinery, equipment, vehicles and improvements used directly in the production processes of the crops and will be applied in the calculation of profitability.

4.2 DESCRIPTION OF CULTURE CYCLE

For better analysis, the flowcharts of the production stages of each culture were raised.

4.2.1 Soy Culture Production Process

The cultivation of soybeans on the property under study is carried out through mechanized no-tillage, using fertilizers and pesticides. One hectare (10,000 m²) was used for data analysis. The varieties of manipulated seeds are transgenic RR, the data refer to the crop year

2019/2020, and the growing period started in September 2019 and ended in April 2020. The soybean production process on the property consists of the steps presented below:

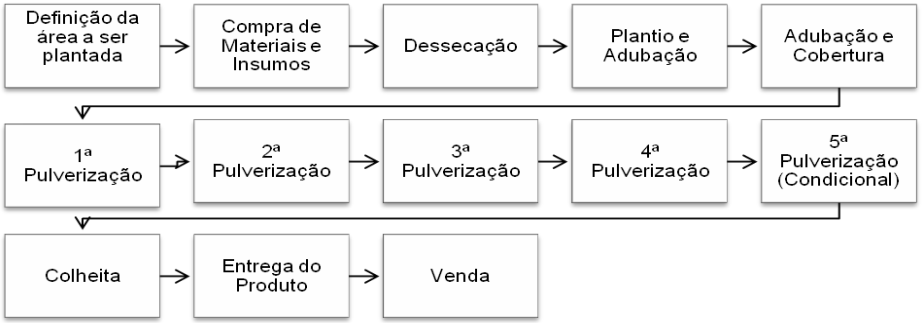


Fig.4: Flowchart of the soybean production process.

Source: From the authors, 2020.

Figure 4 shows the flowchart of the soybean production process, the process begins with the definition of the area to be planted until the moment of sale of your product.

4.2.2 Maize Crop Production Process

The cultivation of corn on the property under study is through mechanized no-tillage, using fertilizers, pesticides and seeds of transgenic Herculex hybrids for production, in which 1 hectare (10,000 m²) was also used for the analysis. The data used refer to the 2019/2020 harvest, which took place between August 2019 and April 2020. The corn production process consists of the following steps:

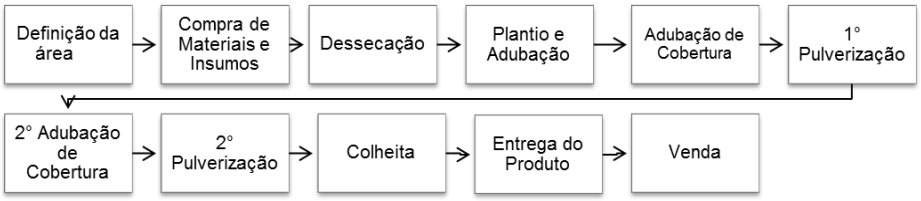


Fig.5: Flow chart of the corn crop production process.

Source: From the authors, 2020.

Figure 5 shows the flowchart of the corn crop production process, the process begins with the definition of the area to be planted until the moment of the sale of the product.

4.2.3 Wheat Culture Production Process

In wheat culture, the planting is mechanized, using chemical fertilizers and pesticides for production, 1 hectare (10,000 m²) was used for data analysis. Planting starts in June 2019 and ends in November 2019 with the harvest. The wheat production process consists of the following steps:

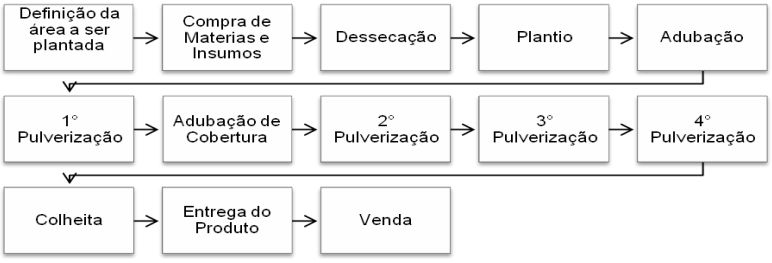


Fig.6: Flowchart of the wheat crop production process.

Source: From the authors, 2020.

Figure 6 shows the flowchart of the wheat crop production process, the process starts with the definition of the area to be planted until the moment of the sale of the product.

4.3 LIFTING OF COSTS

The costs in the analyzed property are made up of inputs, labor, fuels, depreciation, Funrural, while indirect costs are considered as expenses with energy, water, telephone, maintenance, insurance, ITR, interest with agricultural costs and other unforeseen costs during the year. The following is a detailed calculation of costs:

4.3.1 Calculation of Hand Costs in Obra

The cost of labor in the analyzed rural property is composed by the family, being three people, in which all work during the activity of the productive process of the cultures.

For rural employers, the salary and contributions are calculated according to resolution 8212/1991, and the employee is entitled to vacation and 13th salary, the calculation with labor is shown in the following table:

Table 1 - Labor charges in the month

Description	Aliquot	Employee A	Employee B	Employee C	Total
Gross Annual Salary		1.158,00	1.158,00	1.158,00	3.474,00
INSS	0%	-	-	-	-
FGTS	8%	92,64	92,64	92,64	277,92
INSS Company	1,50%	17,37	17,37	17,37	52,11
Vacation		386,00	386,00	386,00	1.158,00
INSS Vacations	0%	-	-	-	-
FGTS Vacations	8%	30,88	30,88	30,88	92,64
INSS Company	1,50%	5,79	5,79	5,79	17,37
13th salary		1.158,00	1.158,00	1.158,00	3.474,00
INSS 13th Salary	0%	-	-	-	-
FGTS 13th Salary	8%	92,64	92,64	92,64	277,92
INSS Company	1,50%	31,27	31,27	31,27	93,80
Total		**2.972,59**	**2.972,59**	**2.972,59**	**8.917,76**

Source: From the authors, 2020.

For the elaboration of Table 1, the calculation of the monthly salary, obligations with INSS and FGTS, vacation, INSS and FGTS on vacation, 13th salary, INSS and FGTS on 13th salary and INSS of the company was used as a basis, cost of R $ 2,979.59 per employee and the total labor cost of employee A, B and C of R $ 8,917.76.

The calculation also included 10% of estimated technical loss, due to the fact that rural areas depend on climatic sources for their production. An average of twenty working days worked per month will be considered, with 8.8 (eight point eight) hours per day.

The following table shows the calculation of available hours and the cost of direct labor applied per product.

Table 2 - Available hours

Days	Hours Days	Total	Loss	Hours available
20	8,8	176,00	17,60	158,40

Source: From the authors, 2020.

Table 2 shows 176 hours available, deducting a 10% loss on monthly hours, reaching a total of 158 hours and 40 minutes worked in the month.

Table 3 - Cost of direct labor applied to the product

Product	Hours	Hourly Cost	Time	MOD
Soy	158,40	18,77	02:01:00	37,85
Corn	158,40	18,77	02:30:00	46,92
Wheat	158,40	18,77	01:42:00	31,90
Total				**116,66**

Source: From the authors, 2020.

In order to raise the labor cost for each product, it was necessary to calculate the monthly hours, after which the hourly cost was calculated and also the estimated time in the production process, from desiccation to harvest, at the end, the labor cost of each product in one hectare (10,000 m²) planted, as shown in Table 3.

4.3.2 Calculation of Depreciation Costs

Depreciation is defined as the loss of the value of the goods, due to their wear and tear or due to the action of time and loss of utility, in the analyzed property there are goods used directly in production and other goods to help in the better performance of functions, depreciation is divided into equipment, machinery and buildings, according to Tables 4 and 5:

Table 4 - Depreciation cost of equipment

Type	Price	Waste		Lifespan	Depreciation / hour
Tractor 90 CV 4R	85.100,00 -	25.530,00	59.570,00	9.000,00	6,62
Platform tractor	138.848,00 -	41.654,40	97.193,60	10.000,00	9,72
Combine harvester	389.019,00 -	116.705,70	272.313,30	4.000,00	68,08
Total					**84,42**

Source: From the authors, 2020.

Table 5 - Depreciation cost of improvements

% maintenance	Maintenance	Fuel	Machine Time	MOD	Total Hourly Cost
75%	7,09	20,44	34,15	18,77	52,92
100%	13,88	37,96	61,56	18,77	80,33
75%	72,94	52,56	193,58	18,77	212,35
					345,59

Source: From the authors, 2020.

Tractors and combines were used to estimate the useful life of the hours worked in each crop, because they are directly related to the production process, as shown below Tables 6, 7 and 8, where the machines are

depreciated by the hours according to their production process, the cost of depreciation by hours and the amount of time used in its entire production process to depreciate 1 hectare (10,000²).

Table 6 - Machine hourly cost in the soybean production process for 1 hectare

Process	Machinery or Equipment	Hourly Cost (R $)	Time spent	Cost (R $)
Desiccation	Trator 90 CV 4R	52,92	00:08:40	7,41
Fertilization and Coverage	Trator 90 CV 4R	52,92	00:06:52	5,75
Planting	Trator plataforma	80,33	00:50:00	66,94
Harvest	Colheitadeira	212,35	00:20:00	70,78
Pulverization	Trator plataforma	80,33	00:35:43	47,44
Total				**198,32**

Source: From the authors, 2020.

Table 7 - Machine hour cost in the production process of Maize for 1 hectare

Process	Machinery or Equipment	Hourly Cost (R $)	Time spent	Cost (R $)
Desiccation	tractor 90 CV 4R	52,92	00:08:40	7,41
1st Fertilization and Coverage	trator 90 CV 4R	52,92	00:06:45	5,69
Planting	Trator plataforma	80,33	01:00:00	80,33
two[The] Fertilization Coverage	Trator 90 CV 4R	52,92	00:27:27	24,05
Harvest	Colheitadeira	212,35	00:30:00	106,17
Pulverization	Trator plataforma	80,33	00:18:02	24,13
Total				**247,78**

Source: From the authors, 2020.

Table 8 - Machine hourly cost in the soybean production process for 1 hectare

Process	Machinery or Equipment	Hourly Cost (R $)	Time spent	Cost (R $)
Desiccation	trator 90 CV 4R	52,92	00:08:40	7,41
Fertilization and Coverage	trator 90 CV 4R	52,92	00:13:39	11,81
Planting	Trator plataforma	80,33	00:24:00	32,13
Harvest	Colheitadeira	212,35	00:20:00	70,78
Pulverization	Trator plataforma	80,33	00:35:43	47,44
Total				**169,57**

Source: From the authors, 2020.

Table 9 - Cost of depreciation by hours worked in each crop for 1 hectare

Product	Worked hours	Total Depreciation (R $)
Soy	02:01:15	198,32
Corn	02:30:54	247,78
Wheat	01:42:02	169,57
Total	**06:14:11**	**615,66**

Source: From the authors, 2020.

Table 9 shows the cost of depreciation per hour worked on 1 hectare.

4.3.3 Calculation of Costs with Inputs

The inputs are of great importance for a good productivity of winter and summer crops. In which herbicides, fungicides, insecticides and fertilizers are generally used, each has a function to protect the plant in its production cycle. It is of great importance to analyze the cost of inputs so that the producer can know the variations that may occur in production. The purchase of inputs is made by the owner. The table below shows the statement of the inputs used in the analyzed crops.

Table 10 - Inputs used in the cultivation for 1 hectare of soybeans

Description	Product	The amount	Unit	Unit Cost (R $)	Total Cost (R $)
Desiccation	Original Roundup	2	L	14,00	28,00
Planting	Seed 5909rr	50	KG	6,00	300,00
Treatment	Standak Top	80	ML	0,75	60,00
Fertilizing	Rhizobium inoculant	100	ML	4,80	480,00
	Fert. Mineral MS09 07.34.11	250	KG	2,44	610,00
Cover fertilization	Potassium Chloride 00.00.60	150	KG	1,78	267,00
1st Spraying	Certero SC480	50	ML	0,18	9,00
	Original Roundup	2	L	14,00	28,00
	Certero SC480	50	ML	0,18	9,00
2nd Spraying	Sphere Max	200	ML	0,27	53,80
	Aller Biw	100	ML	0,01	1,00
	Certero SC480	50	ML	0,18	9,00
3rd Spraying	Sphere Max	200	ML	0,27	53,80
	Aller Biw	100	ML	0,01	1,00
	Connect SC 112.5	750	ML	0,04	32,25
4th Spray	Priori Xtra	300	ML	0,15	43,92
	Aller Biw	100	ML	0,01	1,00
Total					**1.986,77**

Source: From the authors, 2020.

In Table 10, the amount and value of each input used in the soy production process was calculated, according to the amount needed to cultivate 1 hectare (10,000 m²). In this case, the total cost of inputs was R $ 1,986.77.

For the production of corn, the same processes used for soy production are also used, using inputs for their production cycle as shown in the table below:

Table 11 - Inputs used in the cultivation for 1 hectare of corn

Description	Product	The amount	Unit	Unit Cost (R $)	Total Cost (R $)
Desiccation	Original Roundup	2	L	14,00	16,00
Planting and Fertilization	Seed 30f53 Poncho / Standak	1,2	UND	820,00	821,20
	Mineral Fertilizer NPK 10.20.20	400	KG	2,30	402,30
1st Fertilization	Potassium Chloride 00.00.60	150	KG	1,78	151,78
	Soberan SC 630	250	ML	0,53	250,53
1st Spraying	Golden	300	ML	0,02	300,02
	Siptran SC 500	3	L	15,40	18,40
2nd Fertilization	Agricultural Urea 45.00.00	400	KG	2,00	402,00
	Native SC 300	750	ML	0,08	750,08
2nd Spraying	Golden	300	ML	0,02	300,02
	Portero	1	L	52,60	53,60
Total					**3.465,93**

Source: From the authors, 2020.

In Table 11, all the inputs used in the corn crop were surveyed during their production process, where the amount used and the cost of all inputs are shown. The total cost of R $ 3,465.93 was reached for 1 hectare.

The cultivation of wheat is carried out at different times than soybeans and corn, which is cultivated in winter, as follows the table with the presentation of the inputs used in this culture:

Table 12 - Inputs used in the cultivation for 1 hectare of wheat

Description	Product	The amount	Unit	Unit Cost (R $)	Total Cost (R $)
Desiccation	Original Roundup	2	L	14,00	28,00
	Seed Tbio Itaipu	120	KG	2,40	288,00
Planting	Baytan FS 150	80	ML	0,09	7,40
	Derosal Plus FS 500	100	ML	0,07	6,80
	Formax Formaiz	50	ML	0,11	5,50
Fertilizing	Fert. Mineral NPK 08.20.20	300	KG	0,84	252,00
1st Spraying	Hussar VVG 20	100	GR	0,87	87,00
	Hoefix EC 279	200	ML	0,02	3,76
Cover fertilization	Fert. Mineral NPK 36.00.12	200	KG	2,02	404,00
	Fox	400	ML	0,27	108,00
2nd Spraying	Aller Biw	100	ML	0,01	1,00
	Engeo Pleno	100	ML	0,21	20,70
	Sphere Max	200	ML	0,27	53,60
3rd Spraying	Golden	300	ML	0,02	6,09
	Connect SC 112.5	750	ML	0,04	32,25
	Native SC 300	750	ML	0,08	62,25
4th Spray	Golden	300	ML	0,02	6,09
	Engeo Pleno	100	ML	0,21	20,70
Total					**1.393,14**

Source: From the authors, 2020.

Table 12 shows the inputs used in the wheat crop during the production process, showing the amount used and the cost of all inputs. In this case, the total cost of inputs was R $ 1,393.14 for 1 hectare.

It was found that, of the three crops analyzed, the one with the lowest cost is soybeans and the highest cost is corn, but this will depend on the quantity of bags that are produced in 1 hectare, in order to conclude which of the crops the producer obtains the highest profitability. and profitability.

4.3.4 Determination of Indirect Costs

In order to determine indirect costs, it is not possible to allocate them to each product in its production process. In the analysis of this work, they were identified and included in the income statement, where it will deduct from the total gross profit of the three crops and after that arrive at the net result of the crop year.

Table 13 - Annual indirect costs of ownership

Description	Price R$)
Electricity	600,00
Telephone	480,00
Water	120,00
Depreciation	3.284,42
Insurance	7.000,00
ITR	1.800,00
Maintenance	15.912,00
Others	9.000,00
Total	**38.196,42**

Source: From the authors, 2020.

Table 13 shows the total indirect costs of the property, totaling R $ 38,196.42.

4.4 CALCULATION OF THE CROP RESULT IN EACH CULTURE

The objective of every company or agricultural property is to obtain a profit, to know if their work is paying off or not, so it is necessary to analyze the costs and expenses that directly and indirectly influence the result.

Firstly, all costs and expenses that are part of the production process of all crops were verified, after this it was necessary to know the quantity of bags that are produced in 1 hectare and in the total produced of each crop, it was also possible to reach the sale price of the bag (60 kg) after consulting the EPAGRI website for the 2019/2020 harvest at the time the products were sold.

Then, the total produced in each crop is presented, being shown in one hectare and also in the total of the property, the sale price per sack and finally the gross sales revenue that make up the income statement.

Table 14 - Total produced per hectare and gross revenue from sales

Product	Description	Cultivated Area - Hectare	Price of bag 60kg (R $)	Total Harvest (sc)	Gross Revenue (R $)
SOY	Study Area	1	128,00	65,00	8.320,00
	Cultivated Area	290	128,00	18.850,00	2.412.800,00
CORN	Study Area	1	54,00	200,00	10.800,00
	Cultivated Area	230	54,00	46.000,00	2.484.000,00
WHEAT	Study Area	1	72,00	55,00	3.960,00
	Cultivated Area	140	72,00	7.700,00	554.400,00

Source: From the authors, 2020.

According to table 14, corn was then reached as the product with the highest productivity per hectare, with the production of 200 bags (60kg.) Per hectare and 46,000 in the total cultivated by the property, at a sale price of R $

54.00 per bag, generating total revenue of R $ 2,484,000.00 in the crop year. Next is soybeans with the production of 65 bags (60kg.) Per hectare and 18,850 in the total cultivated by the property, at the sale price of R $ 128.00 per bag, generating total revenue of R $ 2,412,800.00 in the crop year. And finally, wheat, with the lowest productivity in bags and per hectare, with 55 bags (60kg.) Per hectare and 7,700 in the total cultivated by the property, at the sale price of R $ 72.00 per bag, generating total revenue of R $ 554,400.00 in the crop year.

4.4.1 Income Statement

The income statement started from the determination of gross sales revenue for one hectare, it was also developed for the total cultivated on the property, after that, the deduction of Funrural was made with the rate of 1.5% on the total of sales, Net Sales Revenue was then arrived at.

Then, the Costs of Products Sold were deducted, which includes inputs, direct labor and the cost of machine hours that are part of the production process of each crop, so the Operational Gross Profit was reached in the crop year 2019 / 2020. Table 16 shows the demonstration for 1 hectare:

Table 15 - Statement of income for the year for 01 hectare

Income Statement - for a Hectare	SOY		CORN		WHEAT	
	R$	%	R$	%	R$	%
Gross Sales Revenue	R$ 8.320,00	100%	R$ 10.800,00	100%	R$ 3.960,00	100%
(-) Taxes - Funrural (1.5%)	R$ 124,80	2%	R$ 162,00	2%	R$ 59,40	2%
(=) Net Revenue	R$ 8.195,20	100%	R$ 10.638,00	100%	R$ 3.900,60	100%
Inputs	R$ 1.986,77	24%	R$ 3.465,93	33%	R$ 1.393,14	36%
Direct labor	R$ 37,85	0%	R$ 46,92	0%	R$ 31,90	1%
Cost Hourly Tractors	R$ 198,32	2%	R$ 247,78	2%	R$ 169,57	4%
(=) Gross Operating Profit	**R$ 5.972,27**	**73%**	**R$ 6.877,37**	**65%**	**R$ 2.305,99**	**59%**

Source: From the authors, 2020.

Table 15 presents the net operating profit for 1 hectare, it is concluded that the property has a positive result, it is observed in the individual analysis of each crop that soybean presented the highest profitability, with 73% on net revenue, corn presented 65% and wheat presented a 59% profit on its net revenue. In the general analysis, soybeans generated the best net operating profit for the producer.

In the analysis below, the value of the total revenue from summer crops was demonstrated, the calculation was made on all areas produced by the producer, deducting all costs and expenses that are part of the production process.

Table 16 - Statement of the total result of the summer harvest

Total Income Statement for Summer Crop	SOY		CORN		TOTAL	
	R$	%	R$	%	R$	%
Gross Sales Revenue	R$ 2.412.800,00	100%	R$ 2.484.000,00	100%	R$ 4.896.800,00	100%
(-) Taxes - Funrural (1.5%)	R$ 36.192,00	2%	R$ 37.260,00	2%	R$ 73.452,00	2%
(=) Net Revenue	R$ 2.376.608,00	100%	R$ 2.446.740,00	100%	R$ 4.823.348,00	100%
Inputs	R$ 576.163,30	24%	R$ 797.164,73	33%	R$ 1.373.328,03	28%
Direct labor	R$ 10.975,17	0%	R$ 10.790,64	0%	R$ 21.765,81	0%
Cost Hourly Tractors	R$ 57.512,16	2%	R$ 56.988,69	2%	R$ 114.500,85	2%
(=) Gross Profit	R$ 1.731.957,37	73%	R$ 1.581.795,94	65%	R$ 3.313.753,31	69%
(-) Financial costs	_		_		R$ 296.400,00	
(-) Indirect costs	_		_		R$ 38.196,42	
(=) Net Operating Profit	_		_		R$ 2.979.156,89	62%

Source: From the authors, 2020.

According to Table 16, the final result of the summer harvest was reached, presenting a net profit of R $ 2,979,156.89, with 62% of its net sales revenue, corn presented the highest sales revenue , but as the costs of corn production are high, soybeans showed the highest profit in relation to corn, obtaining a satisfactory result on both crops and their harvest.

The following is a statement of the total result of the winter harvest, reaching the total gross sales revenue and deducting all indirect costs and expenses that are part of the production process.

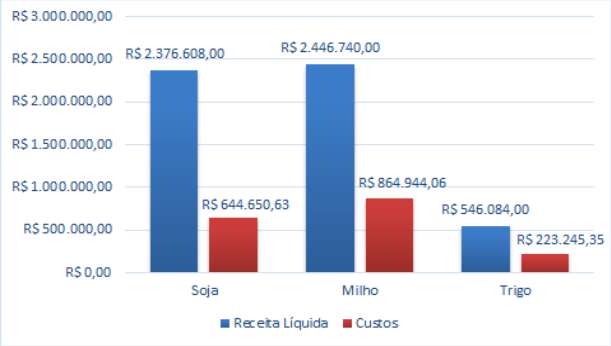
Table 17 - Statement of the total result of the winter harvest

Total Income Statement for Winter Harvest	WHEAT		TOTAL	
	R$	%	R$	%
Gross Sales Revenue	554.400,00	100%	554.400,00	100%
(-) Taxes - Funrural (1.5%)	8.316,00	2%	8.316,00	2%
(=) Net Revenue	546.084,00	100%	546.084,00	100%
Inputs	195.039,60	36%	195.039,60	36%
Direct labor	4.466,39	1%	4.466,39	1%
Cost Hourly Tractors	23.739,37	4%	23.739,37	4%
(=) Gross Profit	322.838,65	59%	322.838,65	59%
(-) Financial costs	_		79.800,00	
(-) Indirect costs	_		38.196,42	
(=) Net Operating Income	_		**204.842,23**	**38%**

Source: From the authors, 2020.

In Table 17, the income statement for the winter crop was not so satisfactory, with a 38% net profit on net revenue, it is possible to observe the high cost of inputs, which was 36%, not being a product with the result is so relevant, but it must be cultivated for soil rotation.

So that the analysis and comparison of each product with the total revenue and its costs can be made, the graph below was elaborated:



Graph 3 - Total revenues and direct costs for the total cultivated

Source: From the authors, 2020.

In view of Graph 3, it was analyzed that soy in relation to corn, presents lower costs and revenue, with the cost / revenue ratio being around 27%, corn found that its sales revenue is higher when compared to the other products, but its cost is also higher, with a cost / revenue ratio of around 35%, whereas wheat has a lower revenue, not being such a profitable crop for the producer, but it constitutes a good alternative for land use (crop rotation) and revenue increase.

The result of rural activity, when positive, will integrate the income tax calculation base for the annual declaration, in its calculation, revenues, expenses and investments. In the case of the exploitation of a rural unit by more than one individual, each rural producer must record the portions of revenue, operating expenses, investments and other values that are part of the rural activity that fits him.

In the analyzed property, it was not possible to calculate the income tax, since the property is composed of three people, thus, the costs, expenses and proven revenues are in the name of the three CPF, it is not possible to verify which cost and expense belong to each of them to perform the calculation.

4.4.2 Profitability Analysis

For the calculation of profitability, the financial data of the property is required, which was presented in the income statement, using the value of sales, costs and expenses to arrive at the percentage of profit of the property. As shown in the income statement, the company's profit is obtained by deducting costs and expenses from total sales. In order to calculate the profitability index, it is necessary to divide the net profit by sales and multiply by 100, as shown below:

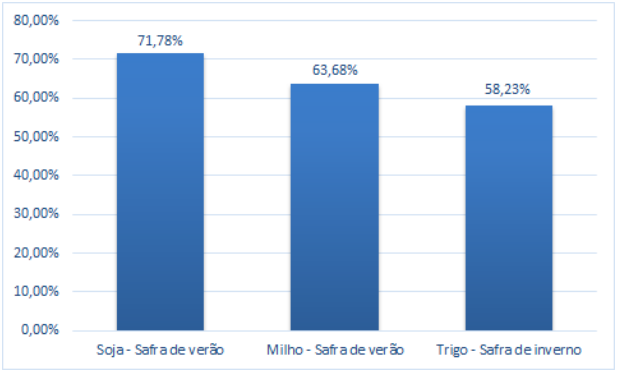
Table 18 - Profitability index for summer and winter crops

Product	Gross Operating Profit (R $)	Sales (R $)	Profitability (%)
Soy	1.731.957,37	2.412.800,00	71,78%
Corn	1.581.795,94	2.484.000,00	63,68%
Wheat	322.838,65	554.400,00	58,23%
Total	**3.636.591,96**	**5.451.200,00**	**6,71%**

Source: From the authors, 2020.

Table 18 shows the calculation of the profitability of the analyzed crops. In soybeans, the percentage of profit it is generating on sales is 71.78% and corn, its profitability index is 63.68%, so in the total summer crop, soybean and corn crops have 67.67 % of profitability, it can be considered that these indices are positive for the producer.

In the winter harvest, wheat cultivation reached a rate of 58.23%, compared to the other crops under study, the percentage of return on sales is low. The annual profitability of the crop year presented a 66.71% profitability over the sales of the three crops.



Graph 4 - Profitability by product grown.

Source: From the authors, 2020.

Analyzing Graph 4, the summer and winter crops, it can be seen that the gain in the summer crops is quite relevant for soybeans, corn has slightly lower profitability than soybeans, but it is still favorable, since winter crop wheat crop shows the lowest profitability index on the graph.

4.4.3 Profitability Analysis

The profitability index shows the return on investment, as shown in the statement As a result, the company's profit is obtained by deducting costs and expenses from the total sales, but in order to calculate profitability, it is necessary to divide the net profit by the investment value and multiply by 100:

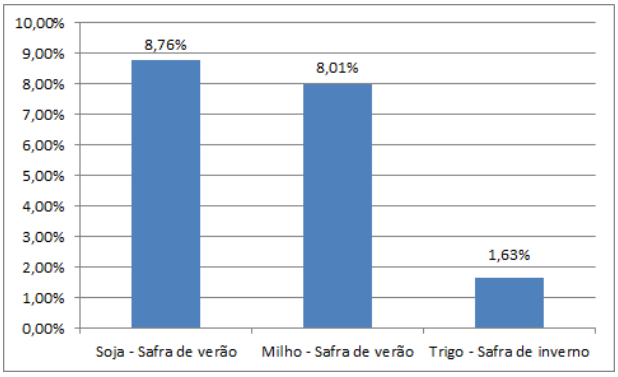
Table 19 - Summer and winter crop profitability index

Product	Gross Operating Profit (R $)	Investment (R $)	Profitability (%)
Soy	1.731.957,37	19.760.000,00	8,76%
Corn	1.581.795,94	19.760.000,00	8,01%
Wheat	322.838,65	19.760.000,00	1,63%
Total	**3.636.591,96**	**33.455.900,00**	**6,13%**

Source: From the authors, 2020.

According to Table 19, the profitability index of summer crops was first identified, soybeans showed an 8.76% return on investment and corn an index of 8.01%, therefore, in the total summer harvest, the soybean and corn crops have 16.77% profitability. Soy has the best index.

For the winter crop, wheat showed a return of 1.63% on the total invested, a low index when compared to the summer crops. The annual profitability of the crop year presented a 6.13% return on investment.



Graph 5 - Profitability by product grown

Source: From the authors, 2020.

It was analyzed in Graph 5 that the summer crops generate more return on investment, mainly the soybean crop which was 8.76%, the corn crop 8.01% and the lowest, the wheat crop with 1.63 %. Profitability is related to the net operating profit and the total investment and the indices are showing the return that each product generated to the producer in the crop year analyzed, comprising summer crops (soybeans and corn) and winter crops (wheat).

4.4.4 Risk and return analysis for 01 hectare

For the analysis of risk and return for 01 hectare, cash flow was used over a period of 10 years, per crop in order to verify the best use, as shown below:

Table 20 - Analysis of net cash flow

Period (YEARS)	SOJA	MILHO	TRIGO
0	- 38.000,00	- 38.000,00	- 38.000,00
1	5.972,27	6.877,37	2.305,99
2	5.972,27	6.877,37	2.305,99
3	5.972,27	6.877,37	2.305,99
4	5.972,27	6.877,37	2.305,99
5	5.972,27	6.877,37	2.305,99
6	5.972,27	6.877,37	2.305,99
7	5.972,27	6.877,37	2.305,99
8	5.972,27	6.877,37	2.305,99
9	5.972,27	6.877,37	2.305,99
10	5.972,27	6.877,37	2.305,99

Source: From the authors, 2020.

From the cash flows, the risk and return indicators were calculated according to the multi-index methodology, proposed by Souza and Clemente (2008), it is characterized by the simultaneous use of two sets of indicators to evaluate the return and risks associated with an investment project, with the objective of obtaining a more comprehensive view of the investment context, facilitating the decision-making process choice of the investment project. Atmulti-index methodology, the return is evaluated by the indicators Net Present Value (NPV), Annualized Net Present Value (NPV), Cost Benefit Index (IBC) and Additional Return on Investment (ROIA). In this case, the multi-index methodology is analyzed by type of culture, as shown in Table 01.

It can be seen that the best product is corn, considering that it has a Present Value of R $ 50,618.00, Net Present Value of R $ 12,618.00, its Annualized Net Present Value is R $ 13,249.00, its Index Benefit per Cost is 1.332 and its Additional Return on Investment per year is 2.91%, with respect to risk, has an Internal Rate of Return of 12.55%, its Minimum Rate of Attractiveness by Internal Rate of Return of 0.40, Risk of Management of 0 , 40 and Business Risk of 0.46.

Followed by soybeans, as it has a Present Value of R $ 43,956.00, a Net Present Value of R $ 5,956.00, its Annualized Net Present Value is R $ 6,254.00, its Benefit Ratio by Cost is 1.157 and itsAdditional Return on Investment per year is 1.47%, with respect to risk, has an Internal Rate of Return of 9.20%, its Minimum Rate of Attractiveness by Internal Rate of Return of 0.54, Risk of Management of 0 , 40 and Business Risk of 0.46.

And later on wheat resulting in a Present Value of R $ 16,972.00, a Net Present Value of negative R $ 21,028.00, its Annualized Net Present Value is a negative R $ 22,079.00, its Benefit Ratio by Cost is 0.447 it's yours Additional Return on Investment per year is -7.74%, with respect to risk, it has an Internal Rate of Return of -8.18%, its Minimum Attractiveness Rate by Internal Rate of

Return of 0.61 negative, Risk of Management of 0.40 and Business Risk of 0.46.

Table 21 - Risk and return analysis

		SOJA	MILHO	TRIGO
RETURN	Present value	43.956	50.618	16.972
	Net present value	5.956	12.618	-21.028
	Annualized Net Present Value	6.254	13.249	-22.079
	Benefit / Cost Index (IBC)	1,157	1,332	0,447
	ROIA / Year	1,47%	2,91%	-7,74%
	Internal Rate of Return (IRR)	9,20%	12,55%	-8,18%
RISK	TMA / TIR index	0,54	0,40	(0,61)
	Pay Back / N			
	Pay Back / N Index			
	Management Risk	0,40	0,40	0,40
	Business Risk	0,46	0,46	0,46

Source: From the authors, 2020.

As shown in Table 21, the winter wheat crop, if analyzed separately, presents a negative Net Present Value - NPV (non-viable), however, because it involves the use of an area that would be idle (during the winter period) in addition to income, allows the use and rotation of the soil.

The Additional Return on Investment - ROIA, is the best estimate of profitability for an investment project, representing, in percentage terms, the wealth generated by the project. In the case of the study in question in relation to the winter crop of wheat, for the reasons explained in the previous paragraph, regarding the analysis of NPV (Net Present Value), ROIA is also negative (-7.74%).

With regard to the risk of the study, the soybean crop has an Internal Rate of Return - IRR of 9.20%, the corn crop 12.55% and the wheat crop -8.18%.

V. CONCLUSION

At the conclusion of the study, it was possible to verify the production processes of the soybean, corn and wheat crops and from there the cost analysis, looking for all the costs allied to these productions and after that to make the segregation by culture (soybean, corn and wheat) with the use of cost accounting, as a tool assisting in efficient management and decision making within the property.

Thus, the objectives sought by the present work were to analyze the profitability and profitability of these crops, verifying in which product the producer obtains better results, at first the cost was made for one hectare, and after that for the entire property cultivated in relation to to the three selected cultures.

In relation to the three crops, soybean was first found, the product in which the producer has the largest cultivated area within the analyzed property and also has higher profitability and profitability indexes. Its cultivation is very favorable for its development, it obtains a good price at the time of its sale and its cost is not so high in relation to the other cultures, in addition, soy is one of the products that has been growing considerably in the last three decades and the producer has enough technologies for its cultivation.

After soybeans, corn was cultivated, a product that in Brazil and especially in the region is widely cultivated by most producers. In the analyzed property, it is the second crop that has the largest area produced in relation to the three crops, its selling price is the lowest, but it is the one that produces the largest amount per hectare, thus achieving a good profitability, its cost is also high in in relation to soybean culture, but still obtain positive results.

Then, the wheat crop, the only winter crop produced by the producer, was verified, its area produced is low, because the climate is not so favorable to this type of crop in the region, it presented the highest cost index in relation to its revenues and profitability rates much lower compared to other crops, but still manages to honor its commitments, it can be said that the producer continues with this crop to promote the use and rotation of soil and increase income.

In the general analysis of production it was observed that in developed crops the producer has very favorable rates for development, it would be to say that he is on the right path for growth, it can be concluded that the crops that provide him with the greatest results are the summer crops, soybeans and corn, where the profitability and profitability of soybean stands out for its market price is good and the cost of inputs is low, whereas corn is favorable because it can produce large quantities in one hectare, where they can be observed in the income statement and in the graphs above.

It is noteworthy that in many cases, like this object of study, the producer does not have control over its costs, that is, their separation for each crop, being extremely important to control, thus improving their planning of future crops and all related items. However, caution is emphasized since these crops are subject to market price fluctuations and climatic problems.

REFERENCES

[1] MARION, José Carlos, Agricultural Accounting, livestock accounting, corporate income tax / José Carlos Marion. 9. Ed. - São Paulo: Atlas, 2007.

[2] _____, Rural Accounting. 9, ed. São Paulo: Atlas, 2006.

[3] MARTINS, Eliseu. Cost Accounting / - 9. Ed. - São Paulo: Atlas, 2003.
[4] BEUREN, Ilse Mario, How to Prepare Monographic Works in Accounting Theory and Practice - 3rd ed. - 3 reprint - São Paulo: Atlas, 2006.
[5] CREPALDI, Silvio Aparecido. Rural Accounting: a decision-making approach / Silvio Aparecido Crepaldi. - 2. Ed. Magazine, updated and expanded - São Paulo: Atlas, 1998.
[6] SOUZA, A .; CLEMENTE, A. Financial decisions and investment analysis: fundamentals, techniques and applications. 6. ed. São Paulo: Atlas, 2008.
[7] EPAGRI / CEPA / SC, Available at: <https://cepa.epagri.sc.gov.br/index.php/produtos/mercado-agricola/Precos-agricolas-diario-Setembro-2020/> Accessed on 01/10/2020.
[8] MINISTRY OF AGRICULTURE. Available in:<http://www.agricultura.gov.br/vegetal/estatisticas 06/10/2019> Accessed on: 06/10/2019
[9] IRS. Available in:<http://www.receita.fazenda.gov.br/PessoaFisica/IRPF/2019/perguntao/assuntos/ividade-rural-conceitos-gerais.htm> Accessed on: 10/10/2019