Economic result of rice crop in the 2019 grow season

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Introduction

The high costs of rice production in the State of Rio Grande do Sul (RS) are probably the most limiting cause for the success of rice farming. These costs of rice farming in RS are estimated annually by the State's Rice Institute (Instituto Riograndense do Arroz, IRGA), allowing to evaluate the financial result of each season of development from the economic point of view. However, these costs are general and an average for the State of RS, differentiating a few systems and types of production costs.

Objective

Our research aimed to evaluate the costs directly with the rice farmers, in a random sampling, and to calculate the monetary result of each field studied through the contribution margin index. Moreover, the objective was to obtain and analyses significant correlations between costs and production outcomes, aiming to reports the relationships we found.

Material and Methods

To collect data for this research, the IRGA census (IRGA, 2006) was initially used to obtain the farmers' contacts, selecting some at random to form a sample. Therefore, the relevant data of each selected rice farmer has been surveyed by phone calls. The information obtained was name of the property, acreage, land tenure, production, value of production and machinery, quantity of urea and other fertilizers, spent fuel, seeds, interest on loans, labor expenses, aviation expenses, fungicide, insecticide and herbicides, electricity, own or outsourced drying, freight, commission expenses, contracted machinery, insurance costs, storage, technical assistance, variables expenses and environmental taxes.
We used the mobile software LUCRAARROZ (not available to the general public yet) developed by Embrapa Pecuária Sul. In total, 76 producers participated. The LUCRAARROZ app allows us to generate the Contribution Margin in total and per bag of rice with the data collected as well as productivity. Then, we use the Excel application for data analysis to evaluate correlation analysis of the variables and also the correlations between those that showed significant correlations.

Results

The average yield of rice for the State of Rio Grande do Sul in this season was 7.508 kg/ha, according to data from the Rio-grandense Rice Institute (Instituto Rio-grandense do Arroz - IRGA, 2019). In the present study, the yield was 7,315 kg/ha on average, which is very close to that estimated by IRGA. Probably this difference is due to the low participation, in our research, of rice farmers of the southern zone of the State, where the productivity was higher (8,198 kg/ha) in the growing season 2018/ 2019.

Table 1- Correlations index (R) between costs of production, yield and contribution margin

	Area	Yield (kg/ha)	Fertilizer (kg/ha)	Urea (kg/ha)	Seed (kg/ha)	Variables expenses R$/ha	Margin/ bag
Area	1						
Yield (kg/ha)	0,083	1,000					
Fertilizer (kg/ha)	-0,339**	0,195*	1,000				
Urea (Kg/ha)	0,010	0,327**	0,396**	1,000			
Seed (kg/ha)	0,078	-0,078	-0,188	-0,083	1,000		
Variables expenses R$/ha	-0,276*	0,272*	0,154	0,134	0,093	1,000	
Margin/bag	0,227*	0,356**	0,021	0,087	-0,095	-0,757**	1

***significant at 5% of probability**
**** significant at 1% of probability**

The area correlated significantly, at a 5% level (Table 1), with the contribution margin per bag (R = 0.227), indicating that the bigger the area is, the higher the contribution margin per bag is. That means larger areas are related to better economic results.
Furthermore, the area had a significant correlation with the base fertilizer (at a 1% level), presenting a coefficient of correlation -0.34 (Table 1). This negative correlation indicates that larger areas use a lower amount of fertilizer per hectare, indicating that farmers with smaller areas use more fertilizer per hectare, thus performing a more intensive production with more costs.
The area correlated significantly at the 5% level (Table 1) with the variable expenses per ha (R of -0.276), indicating that as the area increases, the variable expenses/ha decreases. Therefore, lower variable expense/ha correlated with larger areas is one of the causes of obtaining higher contribution margins as the planted area has got increased.
Rice yield presented a significant correlation coefficient (R = 0.194 at 5% level) with the applied fertilizer (Table 1), indicating that yield increases with the increase of fertilizer applied per ha. The same happened between yield and kg of urea (R = 0.327), with a positive correlation at a 1% level (Table 1). Also demonstrating that yield increases with the amount of urea in the crop, as expected by SOSBAI (2018).
An increase in rice yield was associated with an increase in expenses per hectare, shown by a significant correlation (R = 0.272) at a 5% level (Table 1).

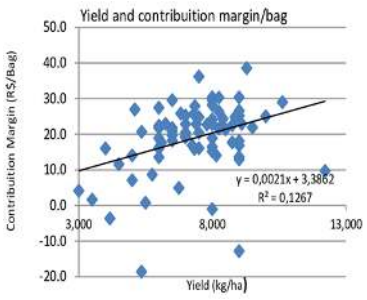

Fig. 1. Contribution margin/50 kg seed bag and yield (kg/ha)

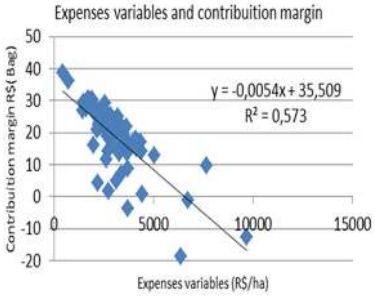

Fig. 2. Variable expenses(R$/ha) and contribution margin/bag

On the other hand, the contribution margin per bag correlated significantly (at a 1% level) with yield (R = 0.356), indicating that the higher the yield, the greater the contribution margin per bag (Fig. 1). This result goes in line, as the contribution margin is the result of productivity (calculated as yield multiplied by the obtained prices) minus variable expenses.
The correlation (Table 1) between variable expenses and contribution margin per bag was significant at a 1% level (R = -0.756). Being a negative correlation it indicates that as variable expenses increase, the contribution margin per bag decreases (Fig.2). Once again, considering the margin calculation form, this result was expected.

Conclusions

Although we found nine significant correlations, being five of them at a probability level of 1%, the expenses variables against contribution margin/bag had a higher correlation level, and also the maximum coefficient of determination, around 60%, which is meaningful at all.