

Sustainability assessment tool applied in large scale, mechanized rice systems in Uruguay

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Introduction

Sustainable intensification practices are designed to meet current and future food security needs while decreasing environmental impacts.

Sustainability assessment of agriculture production systems should cover economic, social, environment and productivity issues.

Uruguay export approximately 95% of his rice production and constantly is looking to add value to its production



Objective

The objective is to assess Uruguay rice production based on a tool that evaluates sustainability with a multidimensional approach.

Material and Methods

- The Sustainable Rice Platform (SRP) which INIA is a member, is a multi-stakeholder program established in 2011.
- The SRP is co-convened by UN Environment and the International Rice Research Institute (IRRI) to promote resource efficiency and sustainability in trade flows, production and consumption operations, and supply chains in the global rice sector.
- The SRP developed a set of instruments to evaluate rice production systems. One of them is based on a survey and its "The standard" and other one is the Performance Indicators.

Figure 1. Themes and Requirements in the SRP Standard for Sustainable Rice Cultivation

SOIL MANAGEMENT	PEOPLE	WATER USE	NUTRIENT MANAGEMENT
<ul style="list-style-type: none"> • Crop calendar • Record keeping • Training 	<ul style="list-style-type: none"> • Heavy metals • Soil salinity • Land conversion and biodiversity • Invasive species • Logging • Pure seed quality 	<ul style="list-style-type: none"> • Water management • Irrigation system at community level • Inboard water quality • Groundwater extraction • Damage 	<ul style="list-style-type: none"> • Nutrient management (organic and/or inorganic) • Organic fertilizer choice • Inorganic fertilizer choice
WATER EFFICIENCY	IMPACTS AND PREVENTION	HEALTH AND SAFETY	LABOR RIGHTS
<ul style="list-style-type: none"> • Weeds • Insects • Diseases • Mollusks • Rodents • Birds 	<ul style="list-style-type: none"> • Timing of harvest • Harvest equipment • Drying time • Drying technique • Rice storage • Rice stove 	<ul style="list-style-type: none"> • Safety instructions • Tools and equipment • Training of pesticide applications • Personal protective equipment • Washing and changing • Applicator relocations • Re-entry time • Pesticide and chemical storage • Pesticide disposal 	<ul style="list-style-type: none"> • Child labor • Hazardous work • Education • Forced labor • Discrimination • Freedom of association • Wages

1. Profitability: net income from rice
2. Labor productivity
3. Productivity: grain yield
4. Water productivity and quality
5. Nutrient use efficiency: N
6. Nutrient use efficiency: P
7. Biodiversity
8. Greenhouse gas emissions
9. Food safety
10. Worker health & safety
11. Child labor & youth engagement
12. Women empowerment

Figure1. Requirements and themes in the Standard and Performance Indicators.



Examples of Results using SRP standard and Performance Indicators

The figure below shows the summarized result of the standard. This is a simulated result based on assumptions. The tool shows the score obtained in the standard and shows how many thresholds failed and in which themes there are missed thresholds.

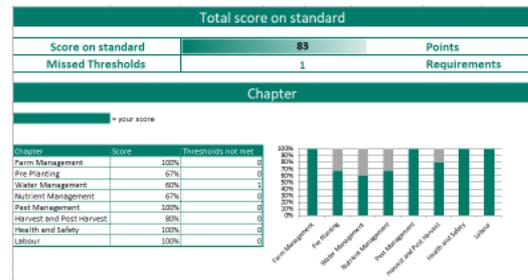


Figure 2. Summarized simulated result on the standard.

Table 1. Example of performance indicators in one season at farm level (n=670).

Performance indicator	Mean	SD	P(10)*	P(90)*
Grain Yield (kg ha ⁻¹)	8346	1717	6098	10269
NUE (kg kg ⁻¹)	112	37	70	153
PUE (kg kg ⁻¹)	483	165	295	683
# spary per season	3.3	0.91	2	4
Methane emissions (kg CH ₄ ha ⁻¹)	180	17	159	200

NUE and PUE: nitrogen and phosphorus use efficiency (kg grain per kg of elemental nutrient). SD: standard deviation; P(10): 10%percentile; P(90): 90%percentile. Grain yield at 14% moisture content. *percentiles were made for each variable.

References

- <http://www.sustainableice.org/>
- <http://www.sustainableice.org/Resources/#srp-standard>
- <http://www.sustainableice.org/Resources/#performance-indicators>

Acknowledgments

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