EXAMINING THE MICRO-LEVEL SUSTAINABILITY STATUS OF CONVENTIONAL AND ORGANIC RICE FARMING SYSTEMS OF KERALA STATE, INDIA

DEEPESH P. CHANGAT, Humboldt University, Germany
VIJESH V. KRISHNA, University of Hohenheim, Germany
S. SURYAPRAKASH, University of Agricultural Sciences (Bangalore), India
SETHULEKSHMI, K.R., University of Kerala, India

1. Introduction

Sustainable development is the maxim of agricultural research in the present era and it is important to measure the level of sustainability and compare the same amidst alternatives. Agricultural sustainability has been defined as the ability of the farming system to maintain its productivity and utility indefinitely. Keeping this definition in view, the study analyses the sustainability status of conventional and organic rice farming of Coastal Kerala and evaluates the factors contributing to the sustainability status of farms.

2. Data and method

Data were collected from 100 farmer households of two rice growing tracts of coastal Kerala, namely Kuttanad and Pokkali. Kuttanad, a major rice production belt of Kerala is described as ***weeping rice bowl***, because the quantity of agrochemicals used in this system is far in excess of the recommended dosage. On the other hand, Pokkali farming is famous for the Organic production process.

Development of Sustainability Index

The sustainability analysis comprises of formation of an index, taking following indicators into account: (i) Economic (gross income per hectare and benefit-cost ratio) (ii) Energy (net energy efficiency, net economic productivity of energy, and net energy productivity of capital) (iii) Farming (fertiliser productivity and pesticide productivity), and (iv) Environmental (cost of nitrate pollution and cost of pesticide pollution). A Composite Sustainability Index was made, providing relative weights derived from an expert survey to each of these 9 components.

3. Results

The nine components cited above were added, after giving the respective weight obtained for each and the Composite Sustainability Index (CSI) was formulated for each farm (Table 1). The results of functional analysis done (dependent variable: CSI) using ordinary least square regression model clearly indicate the impact of the personal attributes of farmers on the sustainability status of farms, irrespective of the region under study (Table 2).

Structural difference between sustainable and unsustainable farms:

The sample farmers were classified as sustainable and unsustainable in each tract based on the CSI. A Chow test was conducted by taking the error sum of squares from two Cobb-Douglas type production functions for each zone. The results reveal that there exist a structural difference between sustainable and unsustainable rice plots. In conventional farming, the inorganic pesticide and fertilizers were applied in a higher number of dozes in sustainable plots. The seed rate and quantity of soil amendments applied was higher in organic plots.

Table 1. Composite Sustainability Index of Rice Farming

Tract / System	Composite Sustainability Index[#]		
	Minimum	Maximum	Mean[##]
1. *Conventional farming tract*			
Upper Kuttanad	0.2318	0.6801	0.4621
Lower Kuttanad	0.2703	0.7944	0.5218
Rice – fallow – fallow system	0.3820	0.7944	0.5277
Rice – rice – fallow system	0.2318	0.6948	0.4820
Overall	0.2318	0.7944	0.4911
2. *Organic farming tract*			
Low Saline Tract	0.4412	0.7852	0.5242
High Saline Tract	0.4697	0.9306	0.5821
Overall	0.4412	0.9306	0.5531

[#] Ranges between 0 and 1
[##]: Computed at the mean level of nine individual components

Table 2. Factors Affecting Sustainability Status of Farms

Explanatory variables	Coefficient (Std error)	
	Conventional	Organic
Area under rice farming (ha)	0.0529	0.0970***
	(0.0410)	(0.0190)
Age of farmer (years)	0.1204	- 0.0800**
	(0.1222)	(0.0333)
Years of schooling	0.0600***	0.0175**
	(0.0159)	(0.0081)
Family size (number)	-0.2943***	-0.0143
	(0.1093)	(0.0195)
Off-farm income (Rs.)	-0.0284	-0.0027
	(0.0282)	(0.0029)
Family labour ratio	-0.0110	-0.0970***
	(0.0417)	(0.0190)
Intercept	-0.4126	-0.0999
	(0.5594)	(0.3457)
R^2	0.2206	0.6386

,*: Significant at 5 and 1 per cent levels, respectively.

4. Conclusion

The study indicates that the personal attributes which influence human resource development are the major determining factors of micro-level sustainability. Organic farms having larger operational areas were showing higher levels of sustainability. The increasing global concern over environmental pollution and human health problems created by agrochemical residues in food and environment , resulting in the rising demand for organically produced commodities, assures a brighter future for such indigenous organic systems.

Tropentag 2006
Prosperity and Poverty in a Globalized World: Challenges for Agricultural Research
University of Bonn, Germany, October 11 - 13, 2006

Contact information

Vijesh V. Krishna, Department of Agricultural Economics and Social Sciences (490b), University of Hohenheim, 70593 Stuttgart, Germany
Email: vkrishna@uni-hohenheim.de