

An assessment of the impact of adoption of System of Rice Intensification -Case from Madagascar-

Masato Kishimoto *, Eiji Yamaji, Takeshi Sakurai, Japan

INTRODUCTION

System of Rice Intensification (SRI) is one of such a sustainable agriculture that has been drawing attention. several studies have investigated factors associated with an adoption of SRI and factors that cause an increase in yield, few studies have focused on the impact of adoption of SRI on farmers in Madagascar.

A study on such an impact that takes endogeneity of the technical adoption into account is particularly lacking.

OBJECTIVE

To estimate the impact of SRI on the improvement of productivity and livelihood of farmers in central highlands of Madagascar.

Impact of SRI on the welfare of a household is elucidated through a survey on the household income of farmers as well as their expenditure and food consumption.

METHODOLOGY

Study site is two communes, where Ampitatsimo and Ilafy, located in Ambatondrazaka District in the Alaotra-Mangoro Region of Madagascar A

Survey was conducted for a total of 400 households in 2014. Additional survey was conducted In 2017.

Propensity Score Matching (PSM)

Average treatment effect on the treated (ATT) is used to measure the difference of the average between SRI farmers (i.e. treated group) and non-SRI farmers (non-SRI group). For addressing the bias from a difference (like farm management capability) between SRI farmers and non-SRI farmers, PSM is used.

$$ATT(psm) = E(y_i | D_i = 1, p(x_i)) - E(y_0 | D_i = 1, p(x_i))$$

y: Adoption of the technology (*y*=1: SRI plot, *y*=0: others)

*β*₀: Slices

*x*_i: Variable pertaining to adoption

RESULTS AND DISCUSSION

For analysis, an SRI plot is defined as a plot where at least one of the components. **The adoption of SRI has not had an impact on yield and income in the area at a household level.**

Estimated results by ATT

plot level		
Variable	ATT result(SRI plots - non-SRI plots)	standard error
Yield (t/ha)	0.37	-0.32
Income from rice (1,000Ar/ha)	243	-153
# non-hired laborers (man-days/ha)	113*	-70.0
Hired labor cost (1,000Ar/ha)	44.4	-43
Observed	630	-
household level		
Variable	ATT result(SRI farmers -non-SRI farmers)	standard error
Average yield for a household (t/ha)	0.39	0.39
Household income (1,000Ar)	601	609
Total expenditure (1,000Ar/ month)	12.4	24.7
Calorie consumption per person (kcal/day)	-30.2	173.3
Observed	325	-

Note: *** p<0.01, ** p<0.05, * p<0.1

Then, comparing mean variables with using fertilizer by using PSM.

The positive impact on yield by plot level. However, because households can't adopt both SRI and the use of fertilizers for all plots, **no significant difference is observed in household income and expenditure.**

Impact of fertilizer inputs

by plot	Estimation by ATT	
Variable	Fertilizer(Fertilizer = 297)	Fertilizer + SRI(Fertilizer + SRI = 61)
Yield (t/ha)	0.37**	0.61***
Income from rice (1,000Ar/ha)	138	302**
Cost of hired labor (1,000Ar/ha)	36.7**	86.0***
# non-hired laborers (man-days/ha)	28.4	78.6*
Observed	630	630
per household	Estimation by ATT	
Variable	Fertilizer(Fertilizer = 181)	Fertilizer + SRI(Fertilizer + SRI = 50)
Household income (1,000Ar)	82.6	588
Average yield for a household (t/ha)	0.26	0.33
Food expenditure (1,000Ar / 1 wk)	-0.361	-0.098
Total expenditure (1,000Ar/ month)	16.9	-16.8
Calorie consumption per person (kcal/day)	17	-37
Observed	325	325

Note: *** p<0.01, ** p<0.05, * p<0.1

CONCLUSION

The findings suggest that a combination of SRI with fertilizer inputs may increase yield significantly if more farmers in the area start using fertilizers in the future. Provision of technical SRI training alongside sales of fertilizers is crucial.

Among farmers surveyed in this study, only one household adopted all four of the SRI components. SRI is considered to be most effective when all of the components are adopted (J-SRI, 2011). For this reason, any area nearby the site for this study where SRI is widely practiced may have adopted all components of SRI and thus increased the yield.

Future Research

To need to conduct further research in our study site to explore the impact on the household adopted all four of the SRI components which is more effective.

In addition, comparison per SRI component was not possible due to the sample size, and an identification of component(s) that is important for the study site could not be conducted.

This study did not consider the number of years through which SRI is continually practiced. One study has suggested that farmers who have continued to practice SRI for a number of years are accustomed to the technology and thus able to improve their productivity (Moser and Barrett, 2003). An analysis that accounts for the number of continuously practiced years would be important in measuring long-term effects of SRI.