Promoting Green Growth, food security and healthy ecosystems in the Vietnamese Mekong Delta with the System of Rice Intensification (SRI)

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"When my neighbors saw my robust plants in the SRI plot, they stopped to examine them and asked me lots of questions on how I managed this." (SRI farmer, Tra Vinh province, 2012)

Summary

The Mekong Delta (MKD) in southern Vietnam is one of many examples for the mutually interfering challenges to global food security, life supporting ecosystems and sustainable economic growth. Against this background, applying the "System of Rice Intensification" (SRI) has shown remarkable potentials in Tra Vinh province of the Delta. Upscaling SRI to the Mekong Delta would support a fundamental shift towards pro-poor Green Growth, as SRI is an innovative form of climate-smart agriculture and combines low input, soil- and biodiversity-conservation, as well as climate change adaptation and mitigation.

Characteristics of the Vietnamese Mekong Delta, "the rice bowl of Vietnam"

Ecologic characteristics

•One of the most productive areas in the world in terms of agricultural production, aquaculture and fisheries.
•One of the areas most vulnerable to climate change impacts worldwide.
•Increasing salinity, natural disasters such as typhoons, storms and floods, and a higher risk of crop failures are already reported.
•Intensive agri- and aquaculture cause heavy water pollution of the land and the regions' ample aquatic ecosystem, the Mekong River.

Economic characteristics of rice production

•Ca. 50% of Vietnam´s rice and circa 90% of the nation's rice exports are produced in the MKD (ca. 6 Million tons in 2011 from the MKD).
•Smallholder based production with average yield of 6 -7 tons per hectare (t/ha).
•Productivity was achieved through various high-input intensification methods.

Rice farmers face challenges due to...

•rising input prices,
•diminishing availability of farm labour,
•reduced profit margins,
•continuously increasing national production and export targets,
•seasonal limited availability of irrigation water, and
•climate change impacts.

The System of Rice Intensification (SRI)[4,5]

•SRI is a flexible set of practices aiming to provide the best environment for the rice plant to utilize its potential, thereby improving the productive efficiency of land, labour, water, nutrients and capital.
•It reduces the need for water, seed and agro-chemical inputs.
•Applying SRI is a climate-smart, low-cost and pro-poor strategy for increasing yields of smallholder rice farmers.
•SRI benefits are reported from more than 50 countries worldwide[7].

SRI techniques compared to conventional methods

	Conventional methods*	SRI
Soil preparation	- Normal levelling - Drainage around the field	- Better levelling - Drainage in and around the field
Nursery	None	Tray nursery
Transplanting / Sowing	- Direct sowing: 150 - 200 kg/ha - Row sowing: 100 - 120 kg/ha	- Single seedling - Seedling age: 8 - 12 days - 20 x 20 cm, square pattern (ca. 5 kg/ha) - Shallow L-shape
Weed control	Herbicides	Manual weeder
Pest control	Multiple preventive spraying	IPM recommended
Soil nutrition	Chemical fertilizer	Organic matter recommended
Aeration	None	At least twice with manual weeder
Water management	Keep fields flooded - Drain for pesticide and herbicide spraying - Keep drained 7 - 10 days before harvesting	Intermittent irrigation, retain soil moisture without flooding - Flood only for fertiliizer applications - Create aerobic soil conditions

[2] In the MKD, transplanting has been abandoned in most parts and now is only practiced for seed production.




Results from two trials in Tra Vinh province, Mekong Delta

Plant performance

	Control 0.1 ha, n = 3	SRI 0.1 ha, n = 5
Yield (t/ha)	7.1	6.6
No. of tillers /plant	3.3	23.0
No. of panicles/plant	1.7	16.0
No. of good grains/panicle	52	91
Variety's growth days	105	105
Drained field days[3]	35	46
Pumping times	5	5
Root system	smaller	strong, healthy
Pest and disease infestation	more	less
Weeds	more	less

[3] Data was derived from the 1st SRI implementation in March 2012.

The saturated soils of the Mekong Delta and the constraints they pose to the development of 'helpful' soil biota might explain the yield lower than expected.

7 times higher tillering effect
9 times more panicles

"SRI plants grew bigger and produced more tillers in better drained ports of the same plot." (SRI farmer, Tra Vinh province, 2012)

"My conventional plots got infected by leaf burn fungi, while the SRI plot remained unharmed." (SRI farmer, Tra Vinh province, 2012)

Economic results

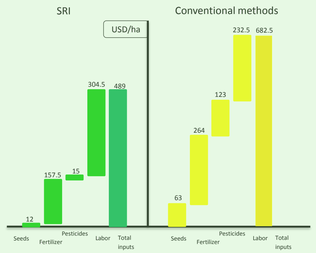
Variables per ha	Conventional methods* n = 392	SRI** n = 5	△ of SRI to conventional methods
Seeds (USD/ha)	62.7	11.3	- 82.0%
Fertilizer (USD/ha)	264.8	157.1	- 40.7%
Pesticides (USD/ha)	122.7	15.0	- 87.8%
Hired machines (USD/ha)	147.6	190.0	28.7%
Labour (USD/ha)	233.1	305.0	30.8%
Total input costs (USD /ha)	**830.9**	**678.4**	- 18.4%
Yield (t/ha)	**5.6**	**6.6**	17.9%
Price of paddy (USD/kg)	0.3	0.3	0.0%
Total revenue (USD/ha)	**1,680**	**1,980**	17.9%
Contribution margin (USD/ha)	**849.1**	**1,301.60**	53.3%

SRI requires higher labour, especially for transplanting and manual weeding/aeration, when competing with direct seeding.

In spite of higher labour costs, total costs with SRI are lower, due to savings in seed, fertilizer and pesticide costs.

SRI yield was higher than the comparison data. This could be due to the small sample size and the crop season effect.

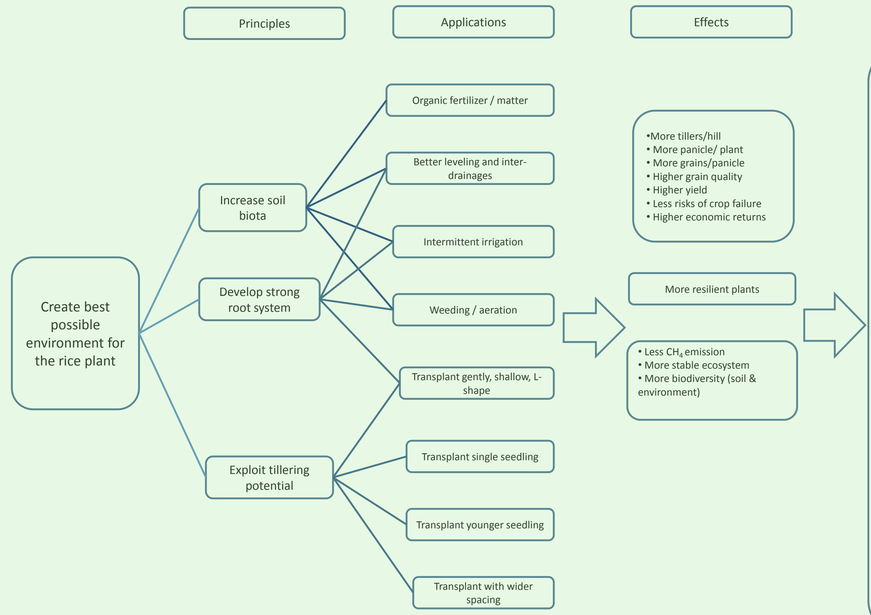
* CM survey data from the summer-autumn crop 2011 which is normally yielding less than the winter-spring crop.
** SRI data from the winter-spring crop 2011/2012.



Further results and other potential benefits

	Conventional methods	SRI
Environmental parameters		
Soil fertility	↘	↗
Prevention of water pollution	↘	↗
Soil- and agrobiodiversity conservation	↘	↗
Climate change mitigation (greenhouse gas emissions)	↘	↗
Climate change adaptation (resilience)	→	↗
Socio-economic parameters		
Social empowerment (self-learning, experience sharing, labour rotation)	→	↗
Reduction of need to compensate for crop failures	↘	↗
Reduction of Government's burden to secure input supplies	↘	↗

SRI principles, applications, effects and development contributions



Food security
SRI has a high potential to sustain food security, especially for small-scale farmers, as it can produce high yields with less inputs and lower risk of crop failure.

Healthy ecosystems
• SRI promotes and stabilizes soil- and agro-biodiversity within rice production ecosystems, mainly due to lesser use of agrochemical inputs.
• Although the MKD is known for its big volume of water, the timely availability of irrigation water is decreasing. SRI, by using less water, can serve as a coping mechanism for salinity intrusion and related conflicts between rice farmers and shrimp farmers.

Climate change
SRI produces strong and resilient plants which more effectively withstand weather hazards, thereby reducing the risk of crop failure due to climate change impacts.

SRI mitigates climate change by reducing CH_4 emissions, resulting from non-flooded fields, and by using less chemical fertilizer.

Pro-poor Green Growth
• SRI farmers can achieve higher profits due to reduced inputs.
• SRI combines economic, ecological and social benefits.





•Challenges

• Future economic growth in the MKD needs to be teamed with poverty orientation, climate change mitigation and adaptation.
• The high average rice yield in the Mekong Delta of 6 - 7 t/ha demands a high level of experience in SRI application to accomplish the comparative advantages with SRI practices.
• In the MKD, the transplanting of rice has been widely abolished and been replaced by direct sowing, except for seed rice production. This poses an additional challenge to SRI adoption, especially due to labour costs for transplanting.
• SRI in the Mekong Delta has to compete with the highly intensive (3 crops/year) and increasingly mechanized rice production practices which are being promoted by institutions and the private sector.

The way forward

The Vietnamese Government has committed itself to effectively tackle climate change adaptation and mitigation, and to promote Green Growth. Implementing SRI combines these commitments in an integrated manner.

"We now have a degree of experience in SRI application in Vietnam. It is evident that SRI increases economic returns and has potential to adapt to climate change. Both researchers and farmers need to work together to explore this potential." (Dr. Bui Ba Bong, Vice-Minister, Ministry of Agriculture and Rural Development of Vietnam, 2009)

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