



# System of Rice Intensification (SRI) - Producing more rice with less inputs - 3 years of experience from Mali



Erika Styger  
SRI International Network and Resources Center (SRI-Rice)

# What is SRI?

- The **System of Rice Intensification (SRI)** is a methodology :
  - For increasing the productivity of irrigated rice cultivation
  - By changing the management of plants, soil, water and nutrients while reducing the external inputs.



# SRI until 1999



Developed in Madagascar by Fr. Henri de Laulanié in mid 1980s, until 1999 practiced only in Madagascar

# SRI in 2010

validated in 42 countries of Asia, Africa, and Latin America



**Before 1999:** Madagascar

**1999/2000:** China, Indonesia

**2000/01:** Bangladesh, Cuba, Laos, Cambodia, Gambia, India, Nepal, Myanmar, Philippines, Sierra Leone, Sri Lanka, Thailand

**2002/03:** Benin, Guinea, Mozam., Peru

**2004/05:** Senegal, Pakistan, Vietnam

**2006:** Burkina Faso, Bhutan, Iran, Iraq, Zambia

**2007:** Afghanistan, Brazil, Mali

**2008:** Rwanda, Costa Rica, Ecuador, Egypt, Ghana, Japan

**2009:** Malaysia, Timor Leste

**2010:** Kenya, DPRK, Panama, Haiti

# SRI in the World

- SRI was developed in Madagascar in the 1980s by Fr. Henri de Laulanié
- The method of SRI was introduced to many countries through efforts of Prof. Norman Uphoff
- Since Aug 2010: **SRI International Network and Resources Center (SRI-Rice)** at Cornell University
  - To support the International Network
  - Make knowledge about SRI available



# 6 Principles of SRI

1. Transplant single seedlings
2. Transplanting at young age: 2 leaf stage (8-12 days old)
3. Wide spacing: 25cm x 25cm or wider, planted in line
4. Minimum water application during vegetative growth
5. Use mechanical hand weeder
6. Application of organic matter as base fertilization



# Benefits of SRI

- Higher yields 50-100%
- Use of 90% less seeds
- Water saving of 25-50%
- Less use of agro-chemicals
- Improved soil fertility
- Improved drought resistance and resistance to climate change



Change in phenotype:  
more roots, higher tiller  
numbers, larger panicles



# Timbuktu region



Sahelo-Saharien and  
Saharien climate

- 150-200 mm rain/yr
- Annual mean Temp:  
29.1°C (13°- 43°C)

Food Security: >70%  
communes are  
among most  
vulnerable in Mali





# Irrigated Rice in the Timbuktu region



Village Irrigation Perimeter  
30-35 ha - 1 motor pump  
Shared among 100 farmers  
0.33 ha / farmers

# SRI in 2007 - Exploratory test

- NGO Africare works for 12 years on Food Security in Timbuktu
- 1 volunteer farmer
- Farmers from surrounding villages participate in a field visit
- Farmers' recommendations:  
To evaluate SRI at larger scale in 2008
- Yield:  
**SRI 9 t/ha, Control 6.7 t/ha**



# Objectives for SRI in 2008

Africare and Ministry of Agriculture

- Adapt the SRI principals to agro-ecological conditions of Goundam and Dire, Timbuktu
- Compare SRI practices with farmer practices





# Year 2: Methodology

- 5 **volunteer** farmers per village  
x 12 villages = 60 farmers
- 2 Treatments: i) SRI ii) Control plot,
- SRI and control plot: side by side
- Start rice nursery the same day with same seeds
- Farmer had free choice of rice variety
- Technical follow up and data collection by solid technical team
- Exchange visits





# Soil preparation of SRI plots

1. Application of manure (10-15 t/ha)



3. Breaking up chunks of soil



2. Soil tilling by hand or tractor



4 Land leveling





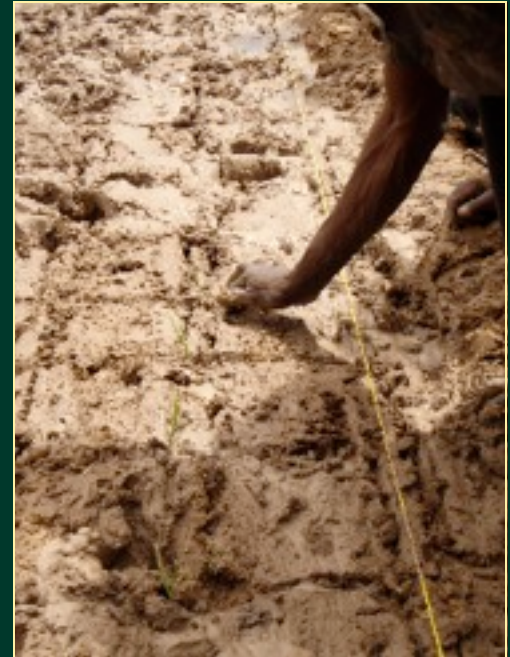


# SRI Nursery

- Mix clay, sand and manure
- Sow after soaking seeds for 24h
- Seedlings appear after 2 days
- Transplanting after 8 to 12 days (2 leaf-stage)



# Transplanting





# SRI Irrigation

During Vegetative period

## **Alternate Wetting and Drying**

- Introducing 1-2 cm of water
- Let the plot dry until cracks become visible
- Introducing another thin layer a water etc.





# Cono-weeding

- First weeding at 20 days after transplanting, repeat every 7 to 10 days
- Incorporates weeds into soil
- Aerates soil
- Stimulates root growth
- Redistributes water across the plot



# Weeding with Sri Lanka Cono-Weeder





# Fields de Asseydou Alhassane, Hara-Hara

30 days after nursery establishment



SRI  
Control  
plot



# Plant development I

Higher tiller number per plant in SRI

SRI



Control



# Plant development II

Faster growth - shorter crop cycle



# Results: Timbuktu 60 farmers 2008

- Yield increase: from 5.5 t/ha to 9.1 t/ha (+66%)
- Less seed required: 85% à 90%  
Quantity used for SRI: 6.1 kg/ha  
Quantity used under usual farmer practice: 40-60 kg/ha
- Reduced fertilizer use: 30%
- Reduced irrigation water use: 10%-30%
- Reduced production costs / kg paddy: 30%
- Increased revenue per hectare: more than double



# Scaling up SRI (2009) - 5 regions in Mali

Africare, IICEM, Syngenta Foundation, IER (Nat. Research), Min Agriculture

- **Timbuktu**  
NEW: 17 villages, 92 farmers  
'OLD': 21 villages, 250 farmers
- **Gao**
  - 8 villages, 39 farmers
- **Mopti**
  - 6 villages, 44 farmers
- **Segou**
  - 2 villages, 37 farmers
- **Sikasso**
  - 3 villages, 10 farmers

**57 villages, 472 farmers**





# Scaling up SRI practices: Year 3

Africare and Ministry of Agriculture

- Communities and farmers take on entire responsibility for scaling up!
- They decide on number of farmers and training of new farmers
- From 60 to 250 farmers (2008 to 2009)
- From 12 to 21 villages
- Technical support reduced





# SRI yields Mali 2009

		SRI t/ha	Farmers' plot t/ha	SRI increase over farmers' plot
<b>Africare farmers</b>				
240 farmers	Timbuktu	<b>7.7</b>	4.5	+72%
<b>IICEM farmers</b>				
38 farmers	Gao	<b>7.8</b>	5.6	+40%
28 farmers	Mopti	<b>7.8</b>	4.8	+64%
36 farmers	Timbuktu (other areas)	<b>7</b>	4.2	+68%
342 farmers	3 regions	<b>7.6</b>	<b>4.8</b>	+58%



# SRI for rainfed and lowland systems in Southern Mali

## 4 Rice systems in Sikasso region

- Upland rice / Riz pluviale
- Lowland rice high zone / Riz bas fond zone haute
- Lowland rice medium zone / Riz bas fond zone moyenne
- Lowland rice low zone / Riz bas fond zone basse



# Checking the SRI principals

IICEM project, IER (Nat. Research) and Ministry of Agriculture

- **1 plant:** yes (direct seeding of 2-3 seeds, thinned to 1 plant)
- **Young transplant:** Direct seeding / yes
- **Wide spacing:** yes
- **Water control:** no
- **Mechanical weeder:** to be tested
- **Organic matter:** yes



SRI plot



Traditional plot



# Results for adapted SRI

IICEM project, IER (Nat. Research) and Ministry of Agriculture



Non-SRI

SRI

Yields (t/ha)  
rainfed/lowland  
systems:

- SRI : 4.2 t/ha
- Control: 3.0 t/ha  
= 40% increase

# SRI for Wheat

## System of Wheat Intensification (SWI)

Africare, Ministry of Agriculture, IER and CAFON (private sector)





# SRI with African Rice Varieties

Africare and Ministry of Agriculture



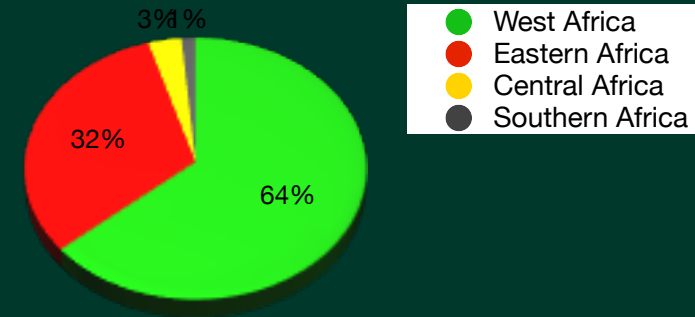
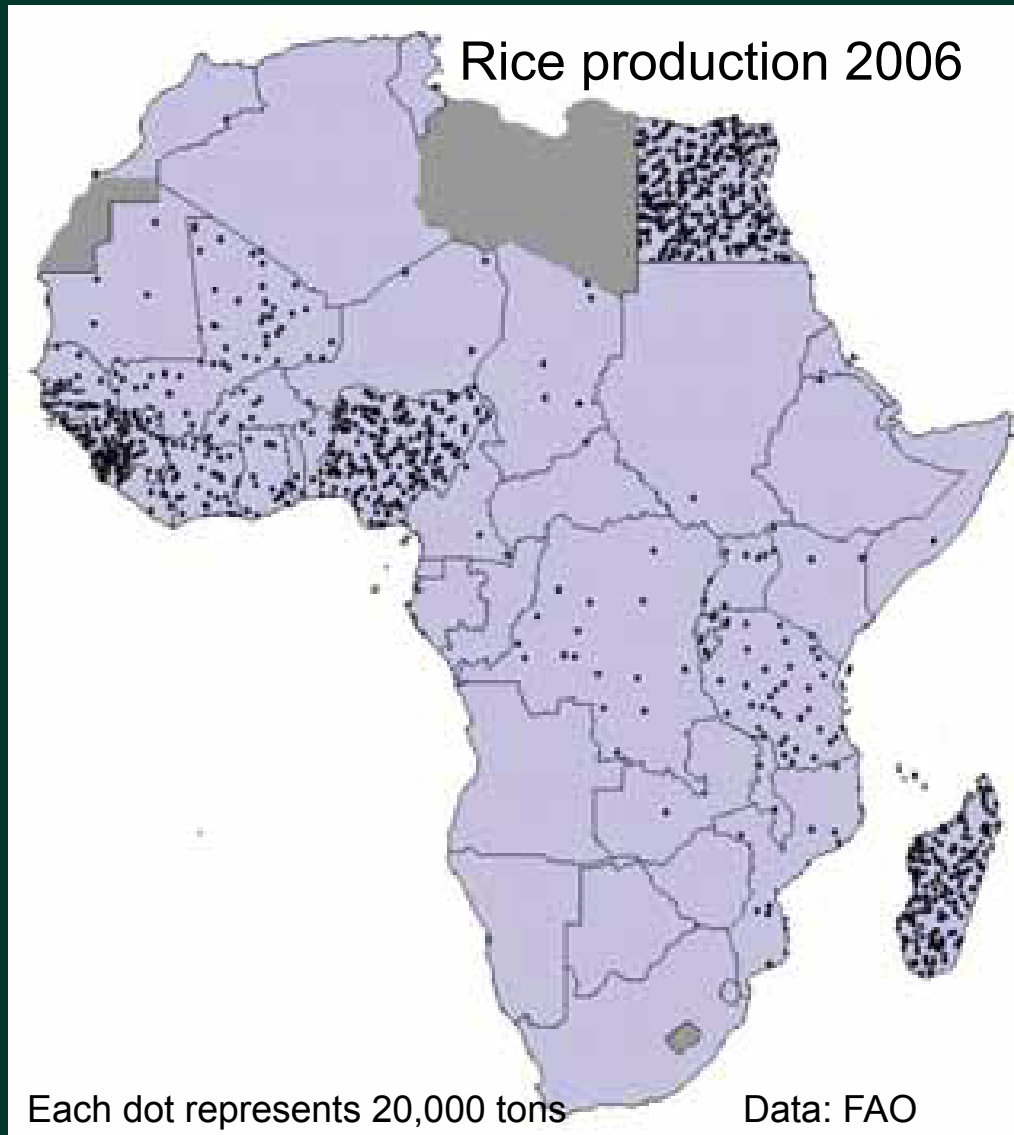
Test *Oryza glaberrima*  
Africa rice  
From 2 t/ha - 4.5 t/ha



# SRI In West Africa since 2001

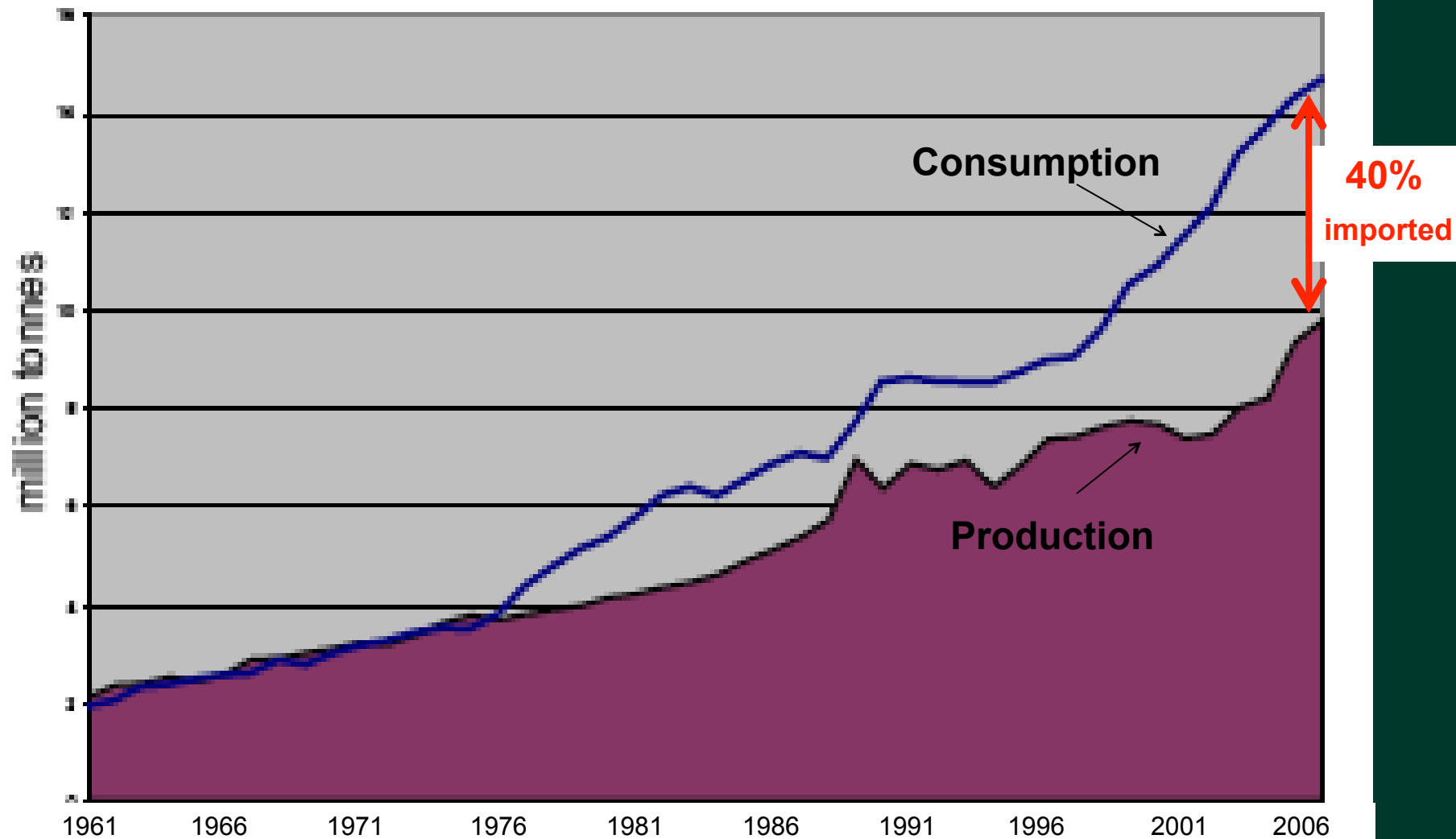
- **Benin 2001:** 1 plot 1 farmer, former Echo intern: SRI 7.5t/ha - follow up?
- **The Gambia 2002-2005:** Research trials and some on-farm work: SRI yields 5.4-8.3 t/ha
- **Guinea 2003:** China National Hybrid Rice Research Development Center with Hybrid varieties: 9 t/ha
- **Senegal 2003-2009:** Rodale Institute test; Dissertation research with WARDA
- **Sierra Leone 2004:** World vision and USAID: SRI 5.3t/ha vs 2.5t/ha
- **Burkina 2006:** 6 farmers in Bobo: SRI 7t/ha vs 3.5t/ha
- **Ghana: 2007-2009** private farmer initiative: 4.18t/ha
- **Mali: 2007-2010** : 3 projects, 5 regions, 450 farmers

# SRI Potential for West Africa?



Production of rice in SSA

# Rice production and consumption in SSA from 1961-2006





# Rice systems in West Africa

- African rice was domesticated Niger Inner Delta 3500 years ago (*Oryza glaberrima*)
- Rice systems are diverse and complex
  - Upland rice / Riz pluviale
  - Rainfed lowland rice / Riz de bas-fond
  - Mangrove swamp rice / Riz de mangrove
  - Deep-water rice / Riz flottant
  - Recession agriculture rice / Riz décrue
  - Irrigated lowland rice / Riz irrigué



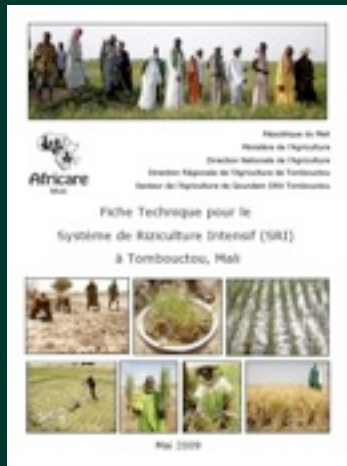
# SRI West Africa Network ? !!

- Solid and strong experience in Mali
  - 50-70 trained technicians, 450 farmers (2009)
- Isolated but promising trials across W-Africa
- Cornell's SRI-Rice would like to support a  
**SRI West Africa Network**
  - Connect initiatives and people
  - Provide technical information and backstopping
  - Knowing who is doing what

**WANT TO JOIN?**



# Resources in French and English



**SRI in Africa and across the world :** <http://sri.ciifad.cornell.edu/countries/index.html>

**Practical Manuals on SRI:** <http://ciifad.cornell.edu/sri/manuals.html>

**More rice for people, more water for the planet**  
[http://www.sri-india.net/documents/More\\_Water\\_For\\_The\\_Planet.pdf](http://www.sri-india.net/documents/More_Water_For_The_Planet.pdf)



**SRI-Rice Website Cornell University**

<http://sri.ciifad.cornell.edu/index.html>

**Contact: Erika Styger, [eds8@cornell.edu](mailto:eds8@cornell.edu)**





# Thank you!



SRI farmers from Donghoi village, Timbuktu

