System of Rice Intensification: An Application of Agroecology

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CIIFAD, Cornell University

SRI is application of AGROECOLOGY, which can be summarized this way:

1. ENHANCE the life in the soil -- i.e., in soil systems -- recognizing the precedence of soil biology as this shapes the soil's chemistry and its physics, and

2. IMPROVE the growing environment (E) for crops, in ways that will induce more productive phenotypes from any given crop genotype (G)

Agroecological principle #1:

SUPPORT the recycling of biomass to (a) *optimize nutrient availability* in the soil, and (b) *balance nutrient flows* in the soil and biosphere over time

Agroecological principle #2:

PROVIDE the most favorable soil conditions possible, so as to
(a) enhance the soil's ***structure***, and
(b) improve the ***functioning*** of soil systems -- especially by
(i) *managing organic matter* and
(ii) *promoting soil biotic activity*

Agroecological principle #3:

MINIMIZE **losses of energy and of other growth factors** within plants' *microenvironments* -- both above and below ground -- in ways that can *maximize resource-use efficiency*

Agroecological principle #4:

DIVERSIFY the varieties of species and the genetic resources within agroecosystems, both *over time and over space*

Agroecological principle #5:

ENHANCE beneficial biological interactions and synergies among **all** of the components of agrobiodiversity -- thereby ***promoting key ecological processes and services***

(Points adapted from Altieri 2002, which adapted points from Reijntjes et al., 1992)

THREE PROPOSITIONS:

(1) Agriculture in the 21st century must be different in many ways from the 20th century because of many factual changes and trends

- These differences are going to make agroecological approaches more economic, more necessary, more desirable & more feasible

THREE PROPOSITIONS:

(2) More productive phenotypes can be achieved from most crop genotypes just by making certain modifications in the management of the *plants, soil, water, and nutrients*

This can be done *right now* and with *lower cost* – no waiting time

THREE PROPOSITIONS:

(3) Higher crop outputs can be attained by doing more to nurture the growth of plant roots and soil biota – these are key to agroecological success

System of Rice Intensification (SRI) is an example of such an approach

(1) In 21st Century agriculture, we cannot continue just doing more of the same:

- Arable land area is declining per capita:
  - *Population* continues to grow, while
  - *Land area* is being lost to urban spread and
  - *Land degradation* increases year by year
- Water supply for agriculture is reducing
  - Competing demands for domestic use & industry
  - *Amount* and *reliability* of water are likely to diminish due to climate changes
- Pests and diseases could increase with CC

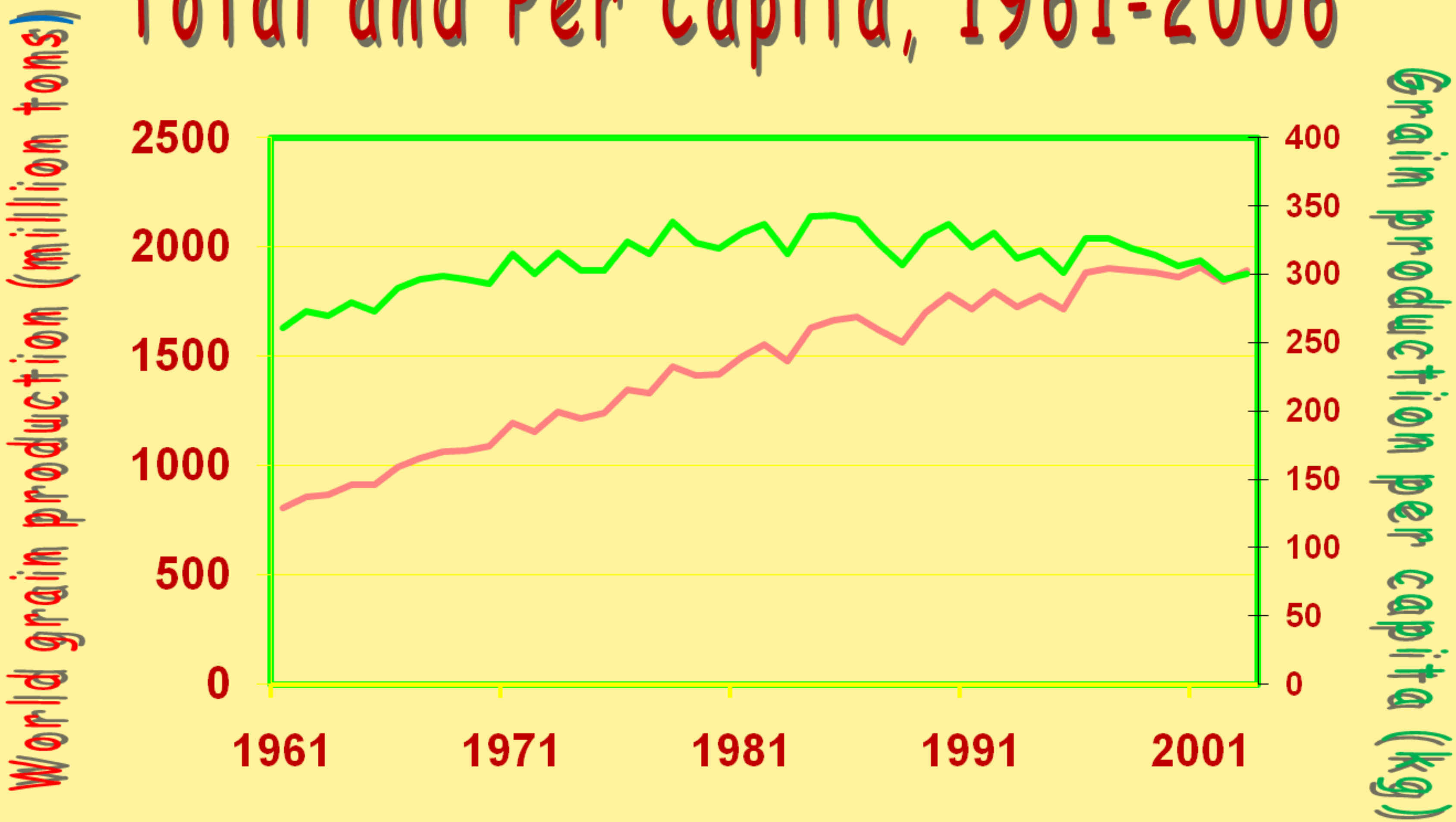
21st Century agriculture must respond to different factor relations and conditions:

- Energy prices are likely to be higher in the 21st than in 20th century → raising our
    - *Production costs*: fuel, fertilizer, agrochemicals
    - *Transport cost*: long-distance trade more costly
- Environmental impacts are greater concern
- Access to technology remains an issue --
    - Many of world's poor are by-passed by GR
- Food quality is becoming more important

Unfortunately, Green Revolution technologies are *losing momentum*

- Success of the GR was based on:
  - Improvements in genotypes (varieties) and
  - Increased inputs: water, fertilizer, etc.
- Our dependence on petroleum-based inputs and energy-intensive production strategies is becoming *more expensive* and less sustainable
  - Land-extensive production will become less and less *profitable* and less economically *viable*
- Gains in grain yield have been slowing since 1990s, and in some places are stagnating

World Grain Production, Total and Per Capita, 1961-2006



It is time to start thinking about "post-modern agriculture" - ???

- This will involve reducing agriculture's energy-intensity & chemical-dependence
- Responding to consumer & environmental demands for 'healthier' food production
- These changes will not happen quickly or completely, but they should begin soon
- *Post-modern agriculture*, being *science-based*, will be the most modern agriculture (microbiology, soil ecology, epigenetics …)

(2) Better phenotypes can be achieved – with *reductions in cost* and from *practically all genotypes* – just by making changes in the management of *plants, soil, water and nutrients*

Biotechnology has focused mostly on *G* in the notional equation: $P = f\,(G \times E)$

Agroecological approaches take any *G* and focus on making improvements in the *E*, both above and especially below ground, to capitalize on *existing genetic potentials*

An example of phenotypical change in CAMBODIA: Rice plant grown from single seed in Takeo province

Phenotypical change in INDONESIA:

<u>Single</u> SRI rice plant
(variety: Cv. Ciherang)
with 223 tillers

Sampoerna PT CSR program in East Java, Panda'an, nr. Malang

Comparison trials at IRAQ's Al-Mishkhab Rice Research Station, Najaf: same varieties - SRI management on left, standard management on right

SRI roots vs. normal flooded roots: note the **differences** in **color** as well as **size**

Picture sent from Haraz Technology Research Center, Amol, Mazandaran, IRAN

INDONESIA: 'Rice Aplenty in Aceh'

as reported in *CARITAS NEWS* Australia, Spring 2009

SRI methods were introduced in Aceh in 2005 by CARITAS after *tsunami* had devastated the area. New methods raised local rice yields from 2 t/ha to 8.5 t/ha: "Using less rice seed, less water and organic compost, farmers in Aceh have quadrupled their crop production."

BHUTAN: Report on SRI in Deorali *Geog*, 2009

Sangay Dorji, Jr. Extension Agent, Deorali Geog, Dagana

Standard practice	3.6 t/ha	SRI @ 25x25cm	9.5 t/ha
SRI random spacing	6.0 t/ha	SRI @ 30x30cm	10.0 t/ha

AFGHANISTAN: 2009 Report from Aga Khan Foundation: Baghlan Province

2008: 6 farmers got SRI yields of 10.1 t/ha vs. 5.4 t/ha regular

2009: 42 farmers got SRI yields of 9.3 t/ha vs. 5.6 t/ha regular

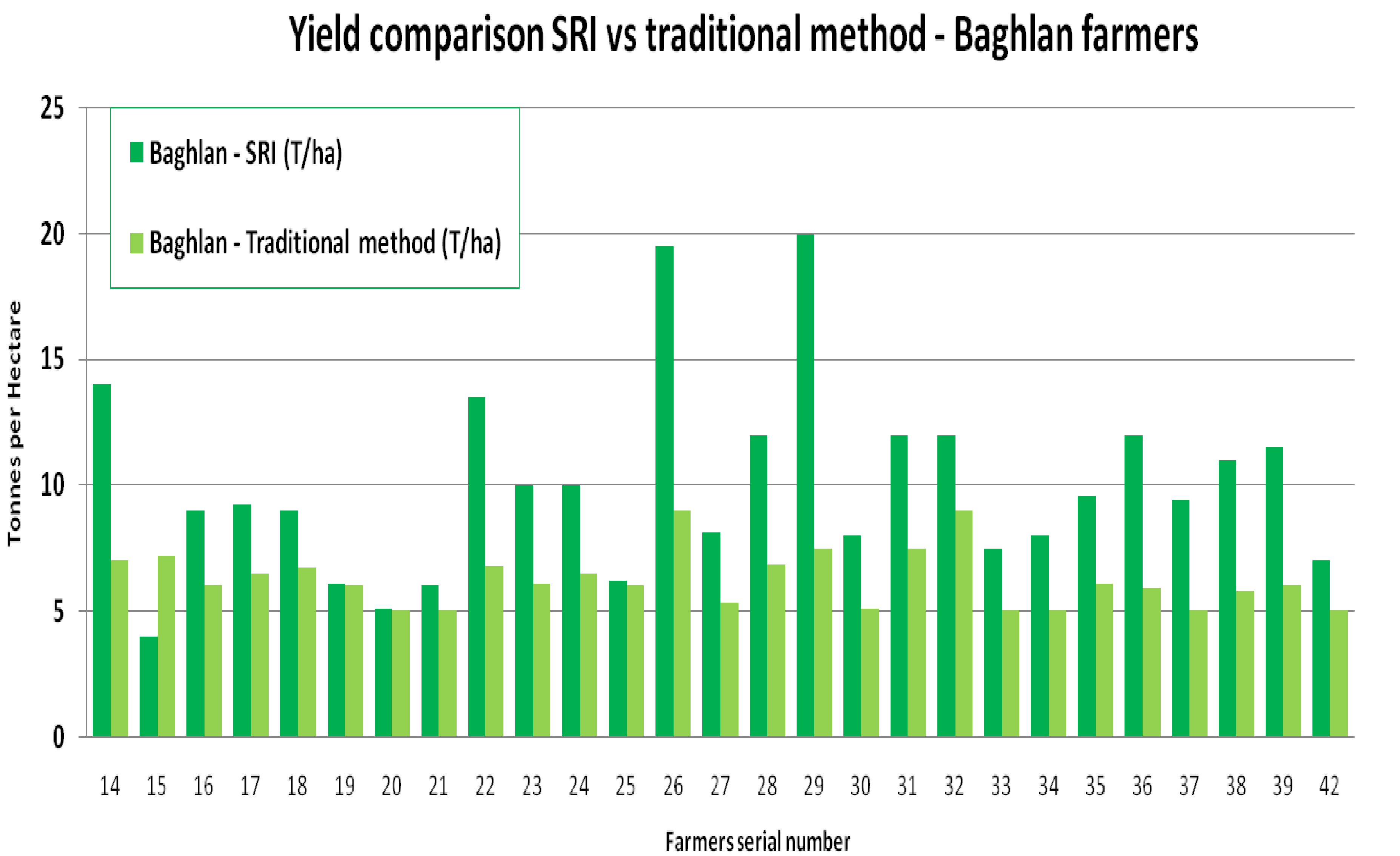
- 2nd year SRI farmers got 13.3 t/ha vs. 5.6 t/ha
- 1st year SRI farmers got 8.7 t/ha vs. 5.5 t/ha

AFGHANISTAN: SRI field in Baghlan Province, supported by **Aga Khan Foundation** Natural Resource Management program, @ 1700 m elevation, with short growing season

SRI field in Baghlan district @ 30 days

SRI plant with 133 tillers @ 72 days after transplanting

11.56 t/ha



In Baghlan District, 2009: only #15 had a reduction in yield; 2nd year farmers #26 and #28 had yields of 19 and 20 t/ha

MALI: SRI nursery in Timbuktu region – 8-day seedlings ready for transplanting

SRI transplanting in Timbuktu, Mali

Farmer in Timbuktu region of Mali showing difference between regular and SRI rice plants

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2007: initial SRI yield was 8.98 t/ha

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Program managed by NGO **Africare** with support from the **Better U Foundation**

MALI: Rice grain yields for SRI plots, control (BP) plots, and farmer-practice plots, Goundam district, Timbuktu region, 2008, on-farm comparison trials

	SRI Plots	Control Plots	Farmer Practice
Yield (t/ha)*	**9.1**	**5.49**	**4.86**
Standard Error (SE)	0.24	0.27	0.18
% Change compared to **Control Plots**	+ 66	100	- 11
% Change compared to **Farmer Practice**	+ 87	+ 13	100
Number of Farmers	53	53	60

* calculated for 14% grain moisture content

CHINA: National Rice Research Institute

Trials conducted over two years, 2004/2005 using two super-hybrid varieties with the aim of breaking the 'plateau' limiting hybrid yields

Standard Rice Mgmt

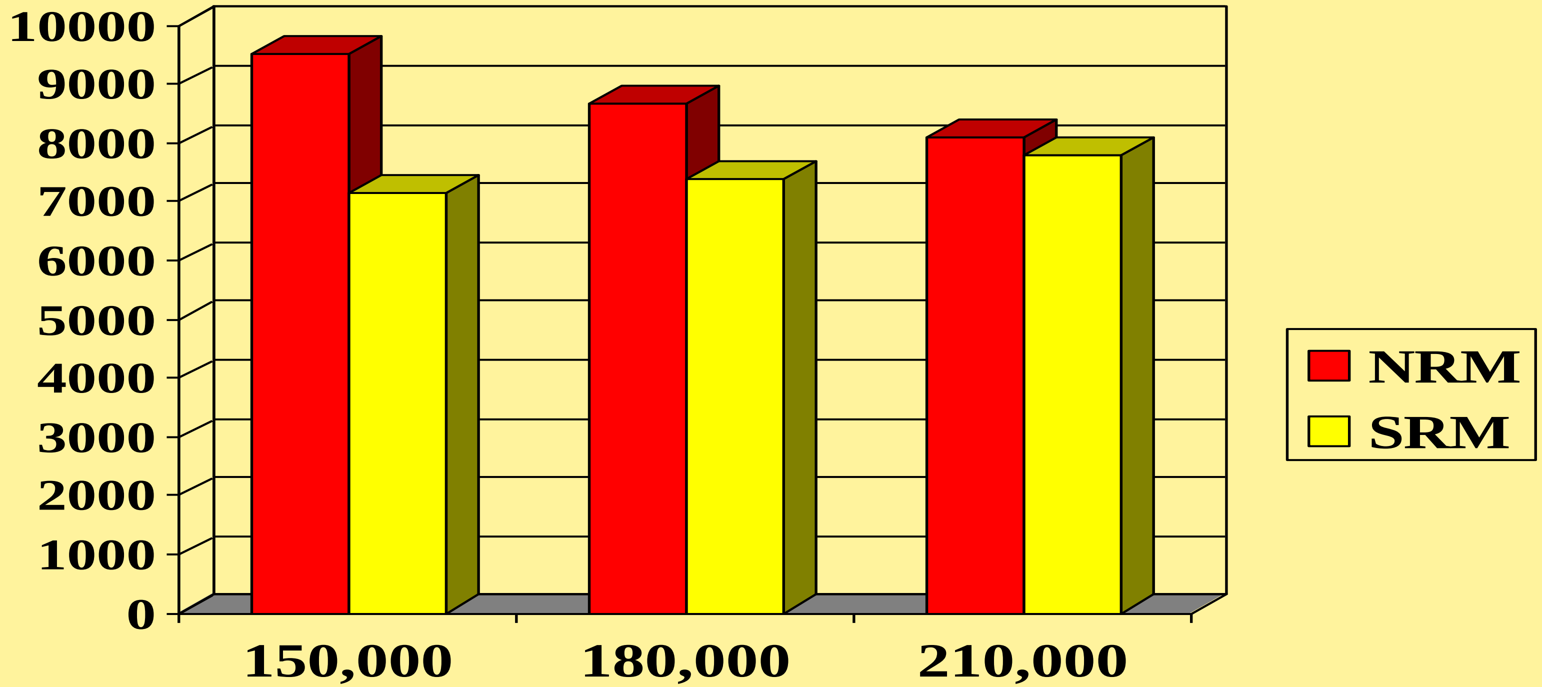
- 30-day seedlings
- 20x20 cm spacing
- Continuous flooding
- Fertilization:
  - 100% chemical

'New Rice Mgmt' ~ SRI

- 20-day seedlings
- 30x30 cm spacing
- Alt. wetting/drying (AWD)
- Fertilization:
  - 50/50 chemical/organic

XQ Lin, DF Zhu, HZ Chen, SH Cheng, N Uphoff (2009). Effect of plant density and nitrogen fertilizer rates on grain yield and nitrogen uptake of hybrid rice (*Oryza sativa* L.), *Journal of Agricultural Biotechnology and Sustainable Development*, 1(2): 44-53

Average super-rice YIELD (kg/ha) with 'new rice management' vs. standard rice management at different plant densities ha^{-1}



Plant population per hectare

SRI practices yield more productive phenotypes

Discuss resistance to drought, storm damage, etc. in p.m. panel

INDIA: ICAR research shows SRI phenotypes giving ***higher <u>water-use efficiency</u>*** -- as indicated by the **ratio** of photosynthesis to transpiration:

For each 1 millimol of water lost by transpiration,

SRI plants fixed 3.6 millimols of CO_2,

RMP plants fixed 1.6 millimols of CO_2

Climate change will make such gains in water efficiency increasingly important – *IRRI's* C_4 transformation is *not the only way to achieve more water-efficient phenotypes*

***A**groecological* **means are now available, not hypothetical**

AK Thakur, N Uphoff, E Antony (2010). An assessment of physiological effects of the System of Rice Intensification (SRI) compared with recommended rice cultivation practices in India. *Experimental Agriculture*, 46: 77-98

DWM (ICAR), India

Root Growth

SRI: better root development - deeper roots, more dry weight, root volume, root length and root length density

Parameters	SRI	TF	LSD$_{0.50}$
Root depth, cm	33.5	20.6	3.5
Root dry weight, g hill^{-1}	12.3	5.8	1.3
Root dry weight, g m^{-2}	306.9	291.8	NS
Root volume, ml hill^{-1}	53.6	19.1	4.9
Root volume, ml m^{-2}	1,340.0	955.0	180.1
Root length, cm hill^{-1}	9,402.5	4,111.9	712.4
Root length density, cm cm^{-3}	2.7	1.2	0.2

DWM (ICAR), India

Root Activity

Volume of **root exudates:** **209%** greater in SRI hills

Rate: **3 times** faster in SRI hills

Manage-ment practice	Amount of exudates per hill (g $hill^{-1}$)	Amount of exudates per area (g m^{-2})	Rate per hill (g $hill^{-1}$ h^{-1})	Rate per area (g m^{-2} h^{-1})
SRI	7.61	190.25	0.32	7.93
TF	2.46	122.95	0.10	5.12
$LSD_{.05}$	1.45	39.72	0.06	1.66

Thakur et al. (2010): Expl. Agric. 46: 77-98

DWM (ICAR), India

Leaf development

- SRI hills had more than twice as many leaves compared to the number in TF hills

- SRI leaves were longer as well as wider than TF leaves

Management practice	Leaf number ($hill^{-1}$)	Leaf number (m^{-2})	Average leaf length (cm)	Average leaf width (cm)	LAI
SRI	79.8	1,997.6	65.25	1.82	3.95
TF	35.6	1,766.5	48.14	1.34	2.60
$LSD_{.05}$	15.8	229.4	6.09	0.21	0.28

DWM (ICAR), India

Canopy structure & Leaf angle

- SRI → greater canopy angle, so open-type canopy structure

- TF → closed-canopy structure

- SRI leaves, being more erect, give better light interception

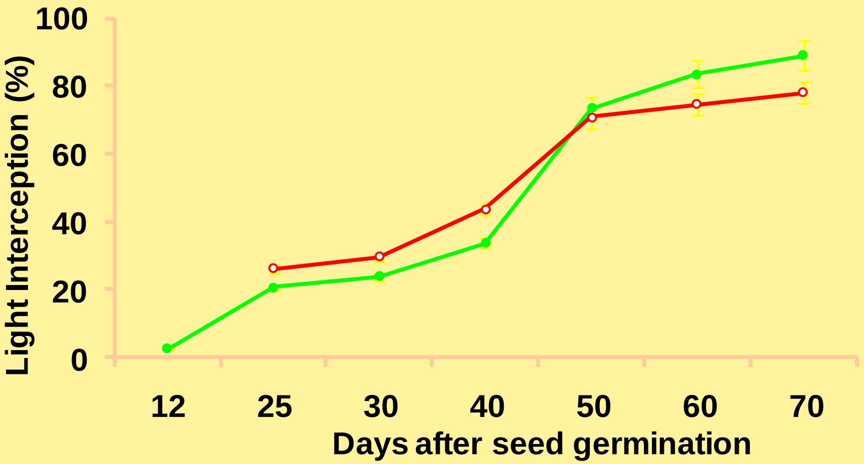
Thakur et al. (2010): Expl. Agric. 46: 77-98

DWM (ICAR), India

Light Interception

SRI plants intercept more light without shading of the leaves

In more closed TF canopy, lower leaves experience more shading, which reduces roots' energy supply



At PI stage: in the SRI plots, light interception reached 89% , while in TF canopies, it was only 78%, giving SRI plants a 15% advantage

DWM (ICAR), India

SRI → Longer panicles, more number of grains in spike (40%), higher 1000-grain weight, and more grain-ripening percentage than in the TF crop → responsible for the higher SRI grain yield -- by 42%

Parameters	SRI	TF	LSD$_{0.50}$
Panicles / m^2	439.5	355.2	61.6
Ave. panicle length, cm	22.5	18.7	2.3
Spikelets / panicle	151.6	107.9	12.9
Filled spikelets, %	89.6	79.3	5.1
1000-grain weight, g	24.7	24.0	0.2
Grain yield, t/ha	6.41	4.50	0.23
Harvest Index (HI)	0.47	0.32	0.04

CHINA: Effects of the System of Rice Intensification and fertilizer N rate on irrigation water use efficiency (IWUE) and total water use efficiency (WUE) (irrigation + rain)

Cultivation systems	N rate	IWUE ($kg\ m^{-3}$) 2005	IWUE ($kg\ m^{-3}$) 2006	WUE ($kg\ m^{-3}$) 2005	WUE ($kg\ m^{-3}$) 2006
TF	N0	0.298 f	0.232 e	0.210 f	0.182 f
	N1	0.371 e	0.278 e	0.262 e	0.218 e
	N2	0.433 d	0.344 d	0.305 d	0.270 d
	N3	0.448 d	0.326 d	0.316 d	0.256 d
SRI	N0	0.675 c	0.602 c	0.399 e	0.396 c
	N1	**0.837 a**	**0.738 a**	**0.494 a**	**0.485 a**
	N2	**0.825 a**	**0.724 a**	**0.483 ab**	**0.475 a**
	N3	0.769 b	0.655 b	0.465 b	0.431 b

Values with the same letters in a column are not significantly different by LSD at the 0.05 level across cultivation systems

TF: traditional flooding; SRI: System of Rice Intensification practices

N0: no N fertilizer ; N1: 80 kg ha^{-1}; N2: 160 kg ha^{-1}; N3: 240 kg ha^{-1}

Influence of the System of Rice Intensification on rice yield and nitrogen and water use efficiency with different N application rates. LM Zhao, LH Wu, YS Li, XH L, DF Zhu, N Uphoff, *Exper Agric* 45: 275-286 (2009).

<u>Drought-resistance</u> **in SRI LANKA:**

Rice fields 3 weeks after irrigation water was suspended; conventionally-grown field on left, and SRI field on right

Storm resistance in VIETNAM: paddy fields in Dông Trù village, Hanoi province, **after typhoon**

SRI field and rice plant on left; conventional field and plant on right

LODGING of rice plants as affected by intermittent vs. ordinary irrigation practices when combined with different ages of seedlings and spacing in Chiba, Japan (Chapagain and Yamaji, *Paddy & Water Envir.*, 2009)

Irrigation method	Seedling age	Spacing (cm^2)	Plant lodging percentage		
			Partial	Complete	Total
Inter-mittent irrigation (AWDI)	14	30x30	6.67	0	6.67
		30x18	40.00	6.67	46.67
	21	30x30	26.67	20	46.67
		30x18	13.33	13.33	26.67
Ordinary irrigation (continuous flooding)	14	30x30	16.67	33.33	50.00
		30x18	26.67	53.33	80.00
	21	30x30	20	76.67	96.67
		30x18	13.33	80	93.33

COLD TOLERANCE in INDIA: Data from an IPM evaluation, ANGRAU, Andhra Pradesh, 2005-06

Period	Mean max. temp. ^{0}C	Mean min. temp. ^{0}C	No. of sunshine hrs
1 – 15 Nov	27.7	19.2	4.9
16–30 Nov	29.6	17.9	7.5
1 – 15 Dec	29.1	14.6	8.6
16–31 Dec	28.1	12.2*	8.6

*Sudden drop in min. temp. during 16–21 Dec. **(9.2-9.8^{o}C for 5 days)**

Season	Normal (t/ha)	SRI (t/ha)
Rabi 2005-06	2.25	3.47
Kharif 2006	0.21*	4.16

* Low yield was due to cold injury for plants (see above)

<u>Disease and pest incidence</u> in VIETNAM:

National IPM Program evaluation: average of data from on-farm trials in 8 provinces, 2005-06:

	Spring season			Summer season		
	SRI Plots	Farmer Plots	Differ-ence	SRI Plots	Farmer Plots	Differ-ence
Sheath blight	6.7%	18.1%	63.0%	5.2%	19.8%	73.7%
Leaf blight	--	--	--	8.6%	36.3%	76.5%
Small leaf folder *	63.4	107.7	41.1%	61.8	122.3	49.5%
Brown plant hopper *	542	1,440	62.4%	545	3,214	83.0%
AVERAGE			55.5%			70.7%

* Insects/m^2

<u>Crop duration</u> in NEPAL: 16-day reduction from seed to seed for 8 rice varieties with SRI vs. conventional methods -- 125 days vs. 141 days, for yields of 6.3 t/ha vs. 3.1 t/ha

Varieties (N = 412)	Conventional duration	SRI duration	Difference
Bansdhan/Kanchhi	145	127 (117-144)	18 (28-11)
Mansuli	155	136 (126-146)	19 (29- 9)
Swarna	155	139 (126-150)	16 (29- 5)
Sugandha	120	106 (98-112)	14 (22- 8)
Radha 12	155	138 (125-144)	17 (30-11)
Barse 3017	135	118	17
Hardinath 1	120	107 (98-112)	13 (22- 8)
Barse 2014	135	127 (116-125)	8 (19-10)

SRI was developed for smallholders in Madagascar, but it is relevant at all scales

- Fr. Henri de Laulanié came there from France in 1961 – had agricultural training
- He started working with farmers to raise yield without dependence on external inputs
- In 1983-84 season he learned effects of young seedlings
- In late 1980s, when *fertilizer* subsidies were removed, he switched over to *compost*

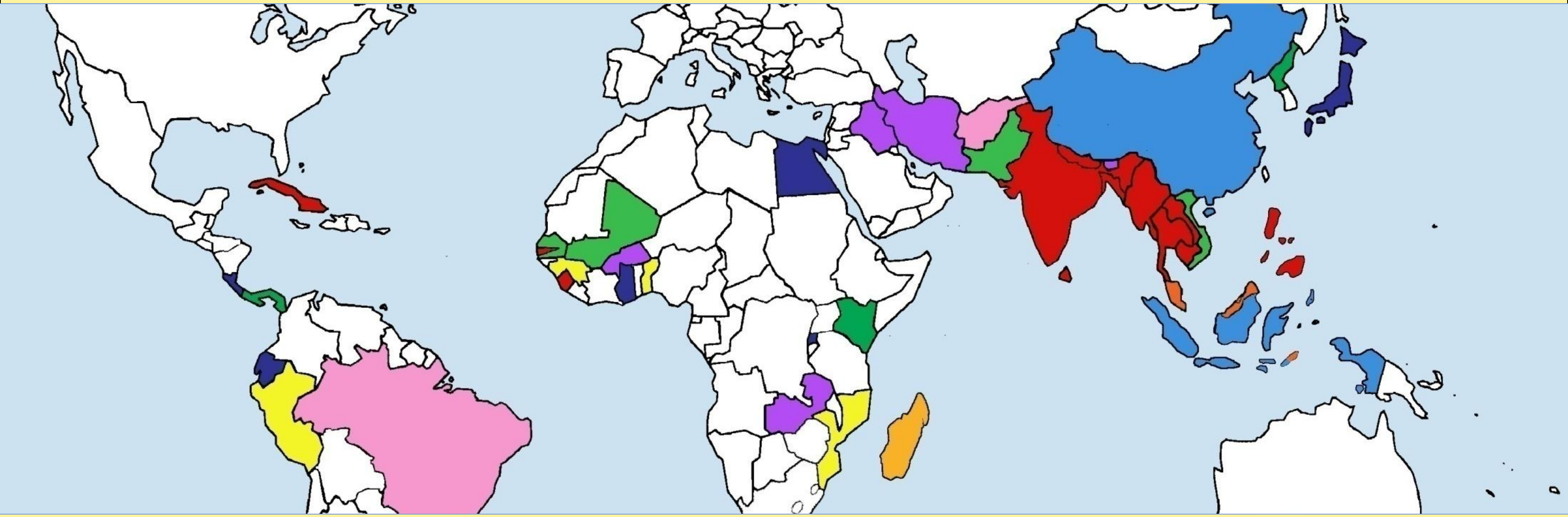
Fr. de Laulanié
making field visit

The Six Basic Ideas for SRI

1. Transplant young seedlings to preserve their growth potential -- but DIRECT SEEDING is now an option
2. Avoid trauma to the roots -- transplant quickly and shallow, *not inverting root tips, which halts growth*
3. Give plants wider spacing -- *one plant per hill* and in *square pattern* to achieve 'edge effect' everywhere
4. Keep paddy soil moist but unflooded -- soil should be mostly aerobic and *not continuously saturated*
5. Actively aerate the soil -- as much as possible
6. Enhance soil organic matter -- as much as possible

1+2+3 stimulate *plant growth* aboveground, while 4+5+6 enhance the growth of *ROOTS and soil BIOTA* → better PHENOTYPES

2010: Benefits of SRI management now 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, Moz., Peru
2004/05: Senegal, Mali, Pakistan, Vietnam
2006: Burkina Faso, Bhutan, Iran, Iraq, Zambia
2007: Afghanistan, Brazil
2008: Rwanda, Costa Rica, Ecuador, Egypt, Ghana, Japan
2009: Malaysia, Timor Leste
2010: Kenya, DPRK, Panama, Haiti . . .

(3) Crop production can be increased today and cost-effectively by paying more attention to rice roots and soil biota, as seen with SRI

- The Green Revolution paid little attention to these key growth-contributing factors
- Most soil biology research has had a narrow focus on N-fixation; little concern with other contributions such as from mycorrhizal fungi
- Little research on effects of exudates on soil biota, and of soil biota on phytohormones
- We begin now to see the beneficial effects of soil biota in roots, in leaves, even in seeds!

CUBA: Farmer showing two rice plants of same age (52 d) and <u>same variety</u> (VN 2084), i.e. both are <u>same genotype</u>

ENDOPHYTIC *AZOSPIRILLUM* IN ROOTS, TILLERING, AND YIELDS X CULTIVATION PRACTICES AND NUTRIENT AMENDMENTS

Results of replicated trials at Anjomakely, Madagascar, 2001 (Andriankaja, 2002)

CLAY SOIL (methods of cultivation)	*Azospirillum* in roots (10^3/mg)	Tillers/ plant	Yield (t/ha)
Usual farmer methods; no amendments	65	17	1.8
SRI with no amendments	1,100	45	6.1
SRI with NPK added	450	68	9.0
SRI methods with compost	1,400	78	10.5
LOAM SOIL			
SRI with no amendments	75	32	2.1
SRI methods with compost	2,000	47	6.6

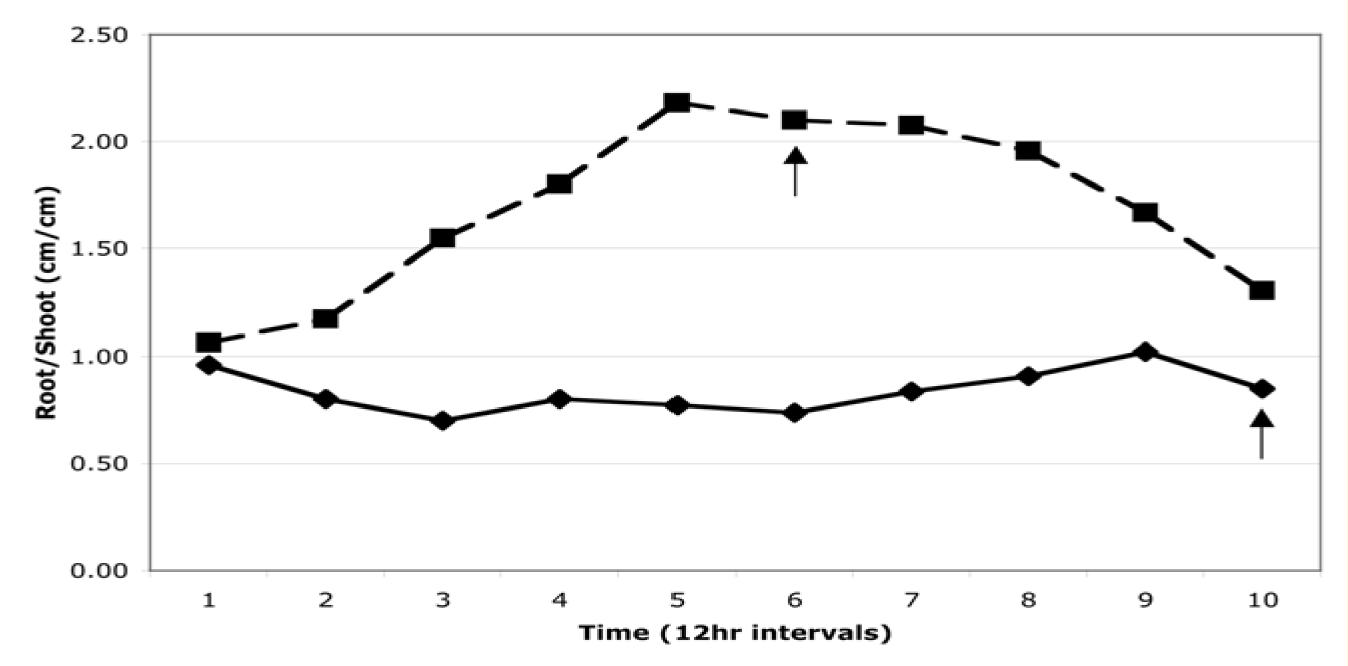
Ascending Migration of Endophytic Rhizobia, from Roots and Leaves, inside Rice Plants and Assessment of Benefits to Rice Growth Physiology

Rhizobium test strain	Total plant root volume/ pot (cm^{-3})	Shoot dry weight/ pot (g)	Net photosynthetic rate ($\mu mol^{-2}\ s^{-1}$)	Water utilization efficiency	Area (cm^{-2}) of flag leaf	Grain yield/ pot (g)
Ac-ORS571	210 36^{A}	63 2^{A}	16.42 1.39^{A}	3.62 0.17^{BC}	17.64 4.94^{ABC}	86 5^{A}
SM-1021	180 26^{A}	67 5^{A}	14.99 1.64^{B}	4.02 0.19^{AB}	20.03 3.92^{A}	86 4^{A}
SM-1002	168 8^{AB}	52 4^{BC}	13.70 0.73^{B}	4.15 0.32^{A}	19.58 4.47^{AB}	61 4^{B}
R1-2370	175 23^{A}	61 8^{AB}	13.85 0.38^{B}	3.36 0.41^{C}	18.98 4.49^{AB}	64 9^{B}
Mh-93	193 16^{A}	67 4^{A}	13.86 0.76^{B}	3.18 0.25^{CD}	16.79 3.43^{BC}	77 5^{A}
Control	130 10^{B}	47 6^{C}	10.23 1.03^{C}	2.77 0.69^{D}	15.24 4.0^{C}	51 4^{C}

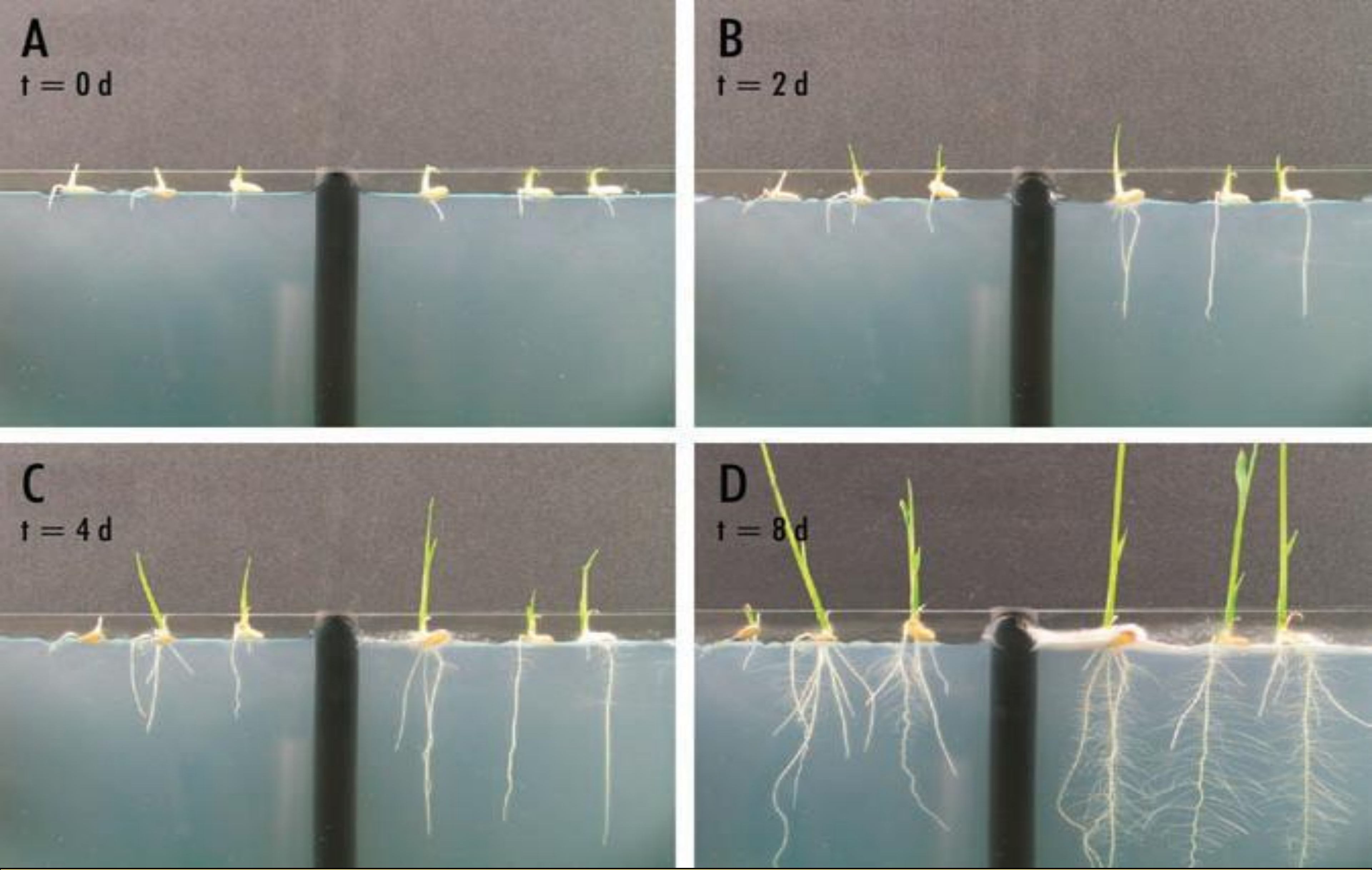
Feng Chi et al.,*J. Applied & Envir. Microbiology* 71 (2005), 7271-7278

Ratio of root and shoot growth in symbiotic and nonsymbiotic rice plants -- symbiotic plants inoculated with *Fusarium culmorum*

R. J. Rodriguez et al., 'Symbiotic regulation of plant growth, development and reproduction,' ***Communicative and Integrative Biology***, 2:3 (2009).



Data are based on the average linear root and shoot growth of three symbiotic (dashed line) and three nonsymbiotic (solid line) plants. Arrows indicate the times when root hair development started.



Growth of rice seedlings, nonsymbiotic (on left) and symbiotic (on right). On growth of endophyte (*Fusarium culmorum*) and inoculation procedures, see Rodriguez et al., *Communicative and Integrative Biology*, 2:3 (2009).

Extensions of SRI to Other Crops: Uttarakhand / Himachal Pradesh, India

Crop	No. of Farmers	Area (ha)	Grain Yield (t/ha)		% Incr.
2006			Conv.	SRI	
Rajma	5	0.4	1.4	2.0	43
Manduwa	5	0.4	1.8	2.4	33
Wheat	Research Farm	5.0	1.6	2.2	38
2007					
Rajma	113	2.26	1.8	3.0	67
Manduwa	43	0.8	1.5	2.4	60
Wheat (Irrig.)	25	0.23	2.2	4.3	95
Wheat (Unirrig.)	25	0.09	1.6	2.6	63

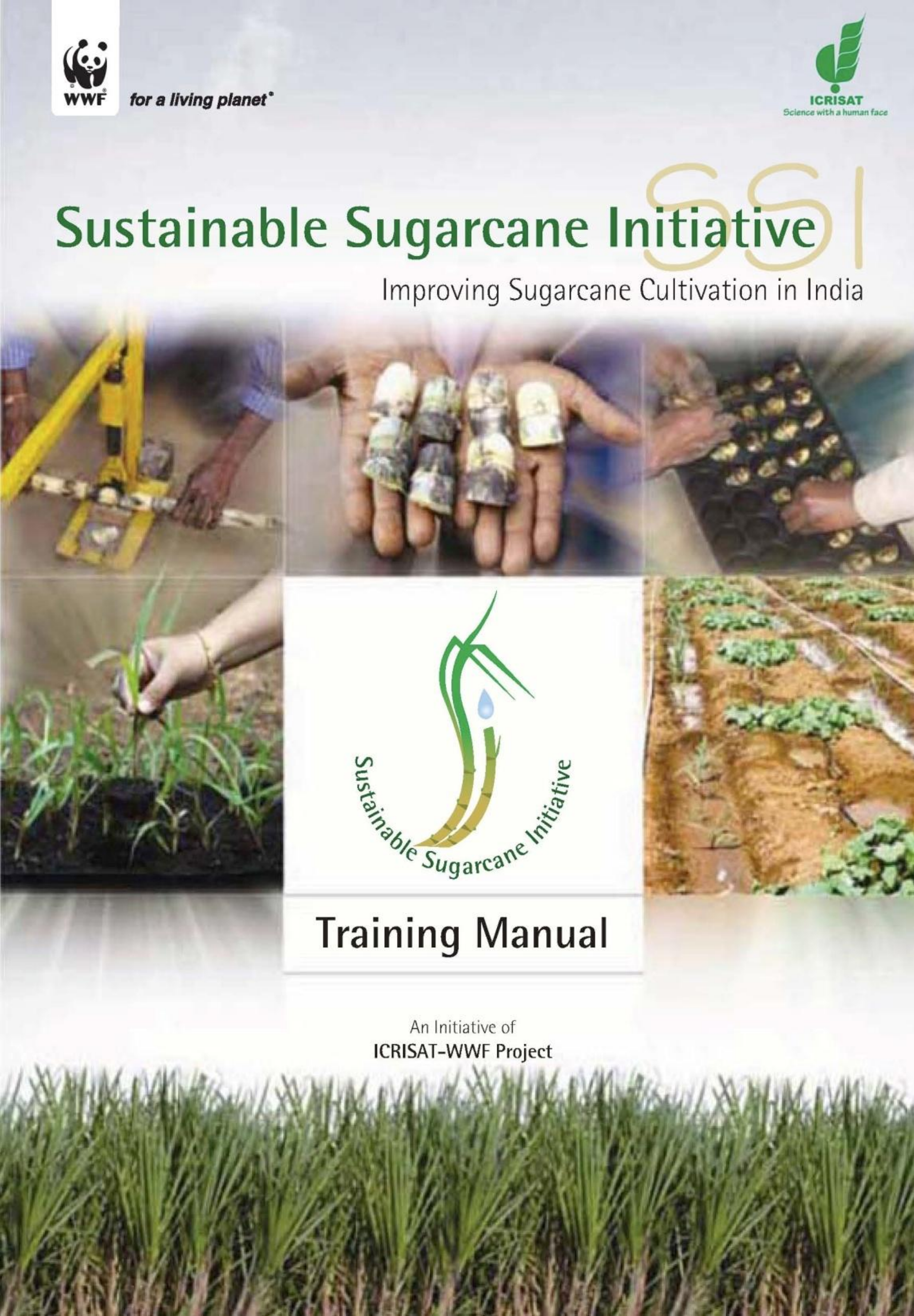
Rajma (kidney beans)

Manduwa (millet)

PEOPLES' SCIENCE INSTITUTE

System of Wheat Intensification on-farm trials, Gembichu, Tigray Province, Ethiopia, 2009-10
-- supported by Oxfam America grant to ISD
39 grains vs. 56 grains per panicle

System of Finger Millet Intensification on left; regular management of improved variety and of traditional variety on right



ICRISAT-WWF Sugarcane Initiative:

at least 20% more cane yield, with:

- 30% reduction in water, and
- 25% reduction in chemical inputs

'The inspiration for putting this package together is from the successful approach of SRI – System of Rice Intensification.'

SRI Results in Major Rice Countries

CHINA:	Sichuan	Zhejiang
Extension started	2004 (1,120 ha)	2005
Area through 2009	637,000 ha	688,000 ha
Average yield increase	1.63 t/ha	1.25 t/ha
Increment due to SRI	1,040,000 tons	862,000 tons

INDIA:

Tamil Nadu: 750,000 ha in 2008-09 season; Minister of Agriculture credited SRI methods with enabling the State to raise its paddy production *despite reduction* in area due to failure of monsoon (*The Hindu* 12/1/09)

Tripura: started with 44 farmers (8.8 ha) in 2002-03; 880 farmers (352 ha, 0.14% of area) in 2005-06; 250,000 farmers (50,000 ha, 21.2%) in 2008-09; in 2007-08, the average yield increase was 1.78 t/ha

"Everyone cites India's Green Revolution. But I'm even more intrigued by what is known as SRI, or system of rice intensification, and I know this is also an area of interest for [Prime Minister] Manmohan Singh.

"Using smart water management and planting practices, farmers in Tamil Nadu have increased rice yields between 30 and 80 per cent, reduced water use by 30 per cent, and now require significantly less fertilizer.

"This emerging technology not only addresses food security, but also the water scarcity challenge that climate change is making all the more dangerous. These are all lessons for our world."

Robert Zoellick, President, World Bank
Hindustan Times, December 2, 2009

PM's speech to meeting of Core Group of Central Ministers and State Chief Ministers on Prices of Essential Commodities, April 8, 2010:

… we must insulate the poor and the vulnerable from any rapid rise in prices of food items and essential commodities … our food production needs to grow at a faster rate. .. The strategies will necessarily be different for different areas of our country. Punjab and Haryana farmers showed the way by adopting intensive, HYV-based agriculture some 40 years ago. They have to do it again **through reduced water use, and through better agronomic practice like the System of Rice Intensification method of rice cultivation…** The need of the hour is to re-focus attention on agriculture and prepare strategies to bring in the next agricultural revolution …

Dialog dengan Petani di Cianjur

Pemerintah Diminta Sebarluaskan Padi SRI

SBY speaking at SRI Harvest Festival, Cianjur, July 30, 2007

"… this SRI method is a proven example where the agriculture is sustainable , and it is a correction to the Green Revolution… This SRI method, by being a solution instead of adding to the problem [of environmental deterioration], and by providing opportunities for agricultural development, is therefore very suitable for Indonesia. "

SOCIALIST REPUBLIC OF VIETNAM

Independence – Freedom – Happiness

MINISTRY OF AGRICULTURAL
& RURAL DEVELOPMENT
No: 3062/QD-BNN-KHCN

Hanoi, October 15th, 2007

DECISION

Acknowledging "The Application of the System of Rice Intensification in rice cultivation in a number of Northern Provinces" to be a technical advance

MINISTER OF AGRICULTURAL AND RURAL DEVELOPMENT

Pursuant to Decree No. 86/2003/ND-CP, dated July 18th, 2003 by the Government regulating the function, task, authority and organization of the Ministry of Agricultural and Rural Development,

Pursuant to the Minutes of the Science and Technology Council, dated April 1st, 2007, on the evaluation of the research project namely "Application of the System of Rice Intensification in rice production in Northern ecological areas in order to implement the "3 more - 3 less" program,

According to the proposal by the Science and Technology Department, DECIDES

Article 1. Acknowledge "The Application of the System of Rice Intensification in rice production in a number of Northern Provinces" to be a technical advance (summary attached).

Article 2. Authors and relevant agencies and institutions be responsible for guiding and disseminating this technical advance in agricultural production.

Article 3. The Ministry's Office Manager, Director of the Science and Technology Department, Director of the Plant Protection Department, Director General of the Cultivation Department, Director of the National Agricultural Extension Center, Directors of the Provincial Agricultural and Rural Departments, and relevant agencies be responsible for implementing this Decision.

FOR MINISTER
Science and Technology Dept.

VICE MINISTER
(signed and sealed)
Bùi Bá Bổng

THANK YOU

- Check out the SRI website: http://sri.ciifad.cornell.edu

- Email: ciifad@cornell.edu or ntu1@cornell.edu