THE SYSTEM OF RICE INTENSIFICATION (SRI): A Different Intensification

21st Session of International Rice Commission
3-5 May, Chiclayo, Peru

Norman Uphoff, CIIFAD
Cornell University, USA

What Are Rice Sector Needs?

- Higher yields – in many countries, not all
- Lower costs of production – to improve farmer incomes
- Reduced water requirements
- Resistance to biotic and abiotic stresses – climate becoming bigger problem
- Less adverse environmental impact – less GHGs, less impact on soil/water quality
- Improved grain quality – higher milling outturn, better eating qualities – SRI does all

What Are Trends in Rice Sector?

- Trend toward younger seedlings
- Lower plant density
- Reduced water applications
- More attention to soil organic matter

[Not the only trends – GMOs, use of agrochemicals, mechanization, etc.]

Agronomically and biologically sound practices were anticipated by SRI

The System of Rice Intensification (SRI) is a 'work in progress' – not finished

But we know that SRI methods can usually:

1. **Raise output by 50% or more with**
2. **Significant reductions in:**
   - **Seed requirements -- by 80-90%**
   - **Water requirements -- by 25-50%**
   - **Agrochemicals – little or no need**
3. **Any/all varieties of seeds can be used**
4. **Costs of production -- lower by 10-25%**
   - **Farmer incomes -- rise by 50-100%**
5. **Favorable environmental impacts**

Brief History of SRI:

SRI was developed in Madagascar 20 years ago by Fr. Henri de Laulanié, S.J., who spent 34 years working with farmers, observing, experimenting, and having also some 'good luck'

- **1983 – Synthesized SRI practices after 20 years**
- **1994 – Tefy Saina and CIIFAD began cooperation**
- **1999 – Nanjing Agricultural University in China and AARD in Indonesia did first trials outside of Madagascar**
- **2006 – SRI effects validated in 20 other countries:**

Bangladesh, Benin, Cambodia, Cuba, Gambia, Guinea, India, Laos, Mali, Mozambique, Myanmar, Nepal, Pakistan, Peru, Philippines, Senegal, Sierra Leone, Sri Lanka, Thailand, and Vietnam

Madagascar SRI field, 2003

Summary of results from SRI vs. BMP evaluations in China and India (t ha^{-1}), 2003 or 2004

Province/state	No. of on-farm comparison trials (area)	BMP ave. yield	SRI ave. yield	SRI advantage (% incr.)
Zhejiang province	(16.8 ha of SRI rice with 2 hybrid varieties)	8.8*	11.9*	3.1* (35.2%)
Sichuan province	8 trials (0.2 ha each)	8.13*	11.44*	3.31* (40.7%)
Andhra Pradesh state	1,525 trials (average 0.4 ha; range 0.1-1.6 ha)	6.31	8.73	2.42 (33.8%)
Tamil Nadu state	100 trials (SRI and BMP trials each 0.1 ha)	5.66	7.23	1.57 (27.7%)

* Note that Chinese comparisons were made using hybrid rice varieties.

SRI gets MORE from LESS by mobilizing biological processes

SRI requirements:

- More labor initially -- while learning method, but *can become labor-saving*
- Water control needed for best results
- Access to biomass for compost is desirable, but can use chem. fertilizer
- Skill and motivation from farmers
- Crop protection in some cases

Basic Practices:

- Start with young seedlings – 8-12 days old (<15 days) to preserve their potential for profuse growth of tillers and roots
- Use single seedlings widely spaced – plant in a square pattern, quickly, gently
- Apply minimum water – with no standing water in fields, enough to keep soil moist
- Weed with a 'rotating hoe' to aerate soil while controlling weeds, returned to soil
- Provide organic matter -- as much as possible -- for soil organisms and plants

Different Paradigms of Production

- **GREEN REVOLUTION strategy based on:**

  (a) Changes in genetic potential of plants, and

  (b) Increases in the use of external inputs -- more water, fertilizer, insecticides, etc.

- **SRI intensifies management, changing the way that plants, soil, water & nutrients are managed:**

  (a) To promote the growth of root systems and

  (b) To increase the abundance and diversity of soil organisms -- to enlist their benefits

These changes → better PHENOTYPES

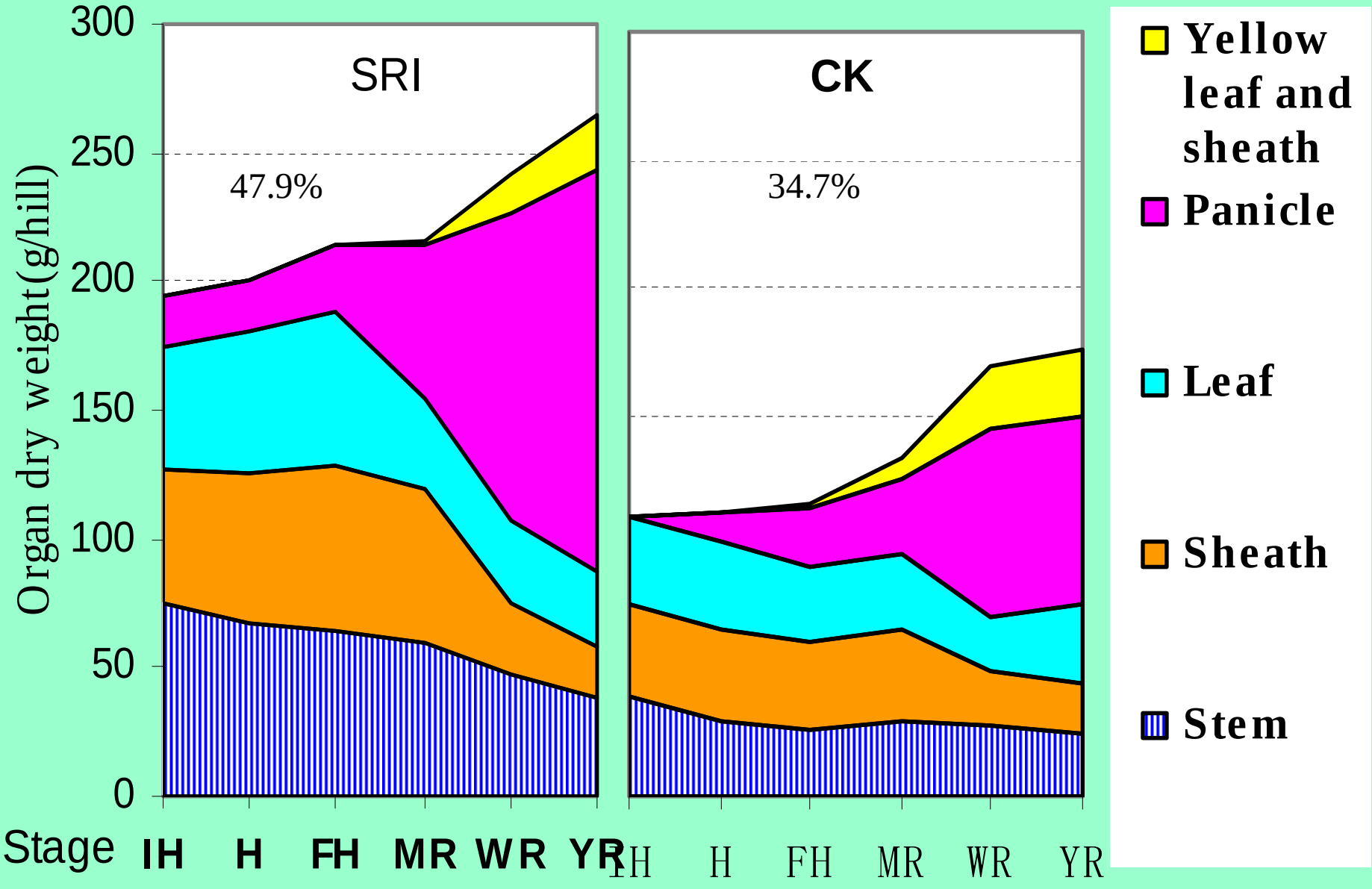
Ms. Im Sarim, Cambodia, with rice plant grown from a single seed, using SRI methods and traditional variety -- yield of 6.72 t/ha

Morang District, Nepal - 2005

Eastern Indonesia --- Nippon Koei Irrigation Project 2004

Women in Dông Trù, Vietnam, who are training other farmers in SRI methods to accomplish potential water-saving possible

Cuba – Two plants the same age (52 DAP) and same variety (VN 2084)



"Non-Flooding Rice Farming Technology in Irrigated Paddy Field"
Dr. Tao Longxing, China National Rice Research Institute, 2004

Rice fields in Sri Lanka: same variety, same irrigation system, and *same drought* : conventional methods (left), SRI (right)

Rice in Dông Trù, Vietnam: normal methods on right; SRI with close spacing in middle; SRI with wider spacing on left

SRI crop in Sri Lanka

Economics of Cultivation (ha^{-1})

Tamil Nadu Agric. Univ. study (N=100)

		Conventional practices	SRI practices
	Income from grains (Rs. 5.00 / kg)	US$ 659	US$ 870
	Income from straw (Rs. 0.25 / kg)	US$ 49	US$ 63
	Gross return	US$ 708	US$ 933
	Cost of cultivation	US$ 466	US$ 414
	Net return	US$ 242	US$ 519
	B : C ratio	1.52	2.25

LESS **CAN PRODUCE MORE**

by utilizing ***biological potentials & processes***

- **Smaller, younger rice seedlings** become **larger, more productive mature plants**
- **Fewer rice plants** per hill and per m^2 give **higher yield** if used with other SRI practices
- **Half as much water** produces **more rice** because aerobic soil conditions are better
- **Greater output is possible** with use of **fewer or even no external/chemical inputs**
- **Even more output within a shorter time**

There is nothing magical about SRI – all can be explained in sound scientific terms

Next Frontier: Rainfed SRI

Reports from three countries showing rainfed (unirrigated) SRI yield = 6-7 t/ha

- **Philippines: 2002 trials – 5 spacings, 4 replications, 4000 m^2 = ave. 7.2 t/ha**
- **Myanmar: 2001-2003 farmer field school demo-fields (N=30): 6.7 t/ha**
- **India, West Bengal state (N=163) – raised from 2.2 t/ha to 7.7 t/ha – max. of 16 t/ha (15 t/ha IWMI evaluation)**

THANK YOU

- Web page: http://ciifad.cornell.edu/sri/

- Email: ciifad@cornell.edu or ntu1@cornell.edu or
- tefysaina.tnr@simicro.mg

Country	Evaluation done by/for:	Yield Increase	Water-Saving	Cost Reduction	Increase in Net Income	Comments
BANGLADESH IRRI-funded evaluation	**BRAC/SAFE BRRI/Syngenta BD Ltd** (Hossain, 2004)	**24%**	**NC**	**7%**	**59% (32-82%)**	On-farm evaluations **(N=1,073)**, funded by IRRI PETRRA project
CAMBODIA National Survey	**GTZ** (Anthofer et al., 2004)	**41%**	**Flooding at TP reduced 96.3%→ 2.5%**	**56%**	**74%**	Survey of 500 SRI users, 100 non-users, randomly sampled in 5 provinces; use of SRI has grown to >40,000 farmers in 5 years
Long-term Users	**CEDAC** (Tech, 2004)	**105%**	**50%**	**44%**	**89%**	120 farmers who had used SRI for 3 years
CHINA	**China Agric. University** (Li et al., 2005)	**29%**	**44%**	**7.4% [ext. service promoting fertilizer & new seeds]**	**64%**	SRI use in village had gone from 7 in 2003, to 398 in 2004; farmers considered labor-saving main benefit

Country	Evaluation done by/for:	Yield Increase	Water-Saving	Cost Reduction	Increase in Net Income	Comments
INDIA Tamil Nadu	**Tamil Nadu Agr. Univ.** (Thiyagarajan et al., 2004)	**28%**	**40-50%**	**11%**	**112%**	100 on-farm comparisons in Tamiraparani Basin, supervised by TNAU and State extension service
Andhra Pradesh	**Andhra Pradesh Agr. Univ.** (Satyanara-yana, 2005)	**38%**	**40%**	**NA**	**NA**	On-farm trials supervised by ANGRAU and State extens. service (N=1,535)
West Bengal	**IWMI-India** (Sinha and Talati, 2005)	**32%**	**Rainfed version of SRI**	**35%**	**67%**	SRI use in villages had gone from 4 farmers to 150 in 3 seasons
INDO-NESIA	**Nippon Koei-DISIMP** (Sato, 2006)	**84%**	**40%**	**24%**	**412%**	3 years of evaluation in E. Indonesia; 1,849 trials conducted on 1,363 ha

Country	Evaluation done by/for:	Yield Increase	Water-Saving	Cost Reduction	Increase in Net Income	Comments
NEPAL	**District Agric. Dev. Office** (Uprety, 2005)	**82%**	**43%**	**2.2%** [rotary hoes not widely available]	**163%**	Morang district users from 1 in 2003 to >1,400 in 2005; data from 412 farmers
SRI LANKA	**IWMI** (Namara et al., 2004)	**44%**	**24%**	**11.9-13.3%**	**90-117%**	Survey of 60 SRI users, 60 non-users, randomly sampled in 2 districts
VIET-NAM	**National IPM Program** (Dông Trù village)	**21%**	**60%**	**24%**	**65%**	Record-keeping by Farmer Field School alumni on SRI results
AVER-AGE		**52%**	**44%**	**25%**	**128%**	

Roots of a single rice plant (MTU 1071) grown at Agricultural Research Station Maruteru, AP, India, kharif 2003

Rice in Tamil Nadu, India: normal crop is seen in foreground; SRI crop, behind it, resists lodging

Resistance to Abiotic and Biotic Stresses:

- **Drought tolerance/resistance**
- **Resistance to lodging to better tolerate wind, rain and storm damage**
- **Cold tolerance – has been seen**
- **Salinity tolerance? – no evidence yet**
- **Cope with future climate change?**
- **Resistance to pests and diseases – *trophobiosis* as explanation?**

Nie Fu-Qiu, Bu Tou village, Zhejiang province, who got a record yield of 12.1 t/ha with SRI in 2004; in 2005, although his area was hit by 3 typhoons, his SRI crop did not lodge; it produced 11.38 t/ha, with a seed-set rate of 93.4% (CNRRI)

Shortening of Crop Cycle

Reported in more and more situations:

- **Best data from District Agricultural Development Office/Morang in Nepal**
  - **Shorter cycle reduces risks of biotic and abiotic stresses**
  - **Also may permit additional cropping**

We are see that weeding, i.e., active soil aeration, shortens the crop cycle and raises crop yield – saving water

Nepal: Monsoon Season, 2005

412 farmers in Morang district using SRI methods, doing different numbers of WEEDINGS – show this can raise yield

Ave. SRI yield = 6.3 t/ha, vs. control = 3.1 t/ha

No. of weedings	No. of farmers	Average yield	Range of yields
1	32	5.16	(3.6-7.6)
2	366	5.87	(3.5-11.0)
3	14	7.87	(5.85-10.4)

Nepal: Monsoon Season, 2005

51 farmers in Morang district who planted popular *Bansdhan* variety using SRI methods (usual maturity @ 145 days)

Age of seedling	N of farmers	Days to harvest	Reduction (in days)
> 14 d	9	138.5	6.5
10 - 14 d	37	130.6	14.4
8 - 9 d	5	123.6	21.4

[WWF/AP evaluation: 7-10 days reduction]

PRADESH THE HINDU 16 NOV. 2005

YSR announces 4-cr. programme for popularising SRI method

World Wide Fund for Nature, ANGRAU take up pilot project

K. Venkateshwarlu

- 212 farmers implementing the method in 10 districts in the State
- It involves water and soil fertility management, planting of seed in a particular manner and weed control
- Discouraging farmers from growing paddy is meant for conserving water and not for restricting free power, says Chief Minister

TARAMATIPET (RANGA REDDY DT): Bowled over by the success of the System of Rice Intensification (SRI), Chief Minister Y. S. Rajasekhara Reddy on Tuesday announced a Rs. 4-crore programme of training and having demonstration plots for popularising this novel paddy cultivation method in every village in the State. The Government will also think of supporting purchase of weeders.

Dr. Reddy who landed right on the farm of G. Nagaratnam Naidu here, appeared pleased with the way paddy was raised using SRI method, held a tuft of freshly harvested crop and showed it to media persons. "We will leave no stone unturned in popularising SRI during the ongoing Rythu Sadassu".

The method being adopted by 212 farmers in 10 districts of the State under a pilot project taken up jointly by the World Wide Fund for Nature and Acharya N. G. Ranga Agricultural University involved water and soil fertility management, planting of seeds in a particular manner and weed control.

The crop raised used less of water and the yield was high. It had nothing to do with seed variety called "Sri Vari" as is being popularly perceived.

Interacts with farmers

Later Dr. Reddy preferred to sit down with the farmers who have adopted the SRI cultivation and heard them share their experiences. Mr. Naidu said under SRI, he planted only 2 kg of seed, used less water and obtained 92 bags of rice per acre. Balamanemma of Mahbubnagar, Varalaxmi of Anantapur, K.V. Rao of Guntur had similar success stories to narrate.

Dr. Reddy said the Government's campaign on discouraging farmers from going in for paddy in rabi was basically meant for conserving water for the coming years when the rainfall could be less. It was not for restricting free power supply, which would continue for the next four years.

Taking a dig at the previous Telugu Desam Government, he said a party, which was not able to supply power for ten minutes, was now finding fault with Congress Government's policy on free power supply covering 95 per cent of farmers.

Only income tax payees and big farmers having more than three pumpsets were being asked to pay charges. "This decision has the approval of farmers in all the 22 districts but TDP wants to support big farmers." The Government also encouraged farmers to go in for crop diversification for which Rs. 17 crores has been earmarked as subsidy.

Agriculture Minister, N. Raghuveera Reddy and Major Irrigation Minister, P. Lakshmaiah were present. Gujja Biksham, Policy Advisor, Global Freshwater Programme, WWF introduced the farmers and Vinod Goud project coordinator, WWF dialogue project spoke.

BOWLED OVER: *Chief Minister Y.S. Rajasekhara Reddy harvesting a tuft of System of Rice Intensification (SRI) paddy at a farm in Taramatipet in Ranga Reddy District on Tuesday. Ministers N. Raghuveera Reddy and Ponnala Lakshmaiah are also seen.* – PHOTO: D. GOPALAKRISHNAN

Questions: Willem Janssen

- **Under what conditions functioning well?**
  - **Soil type -- no limitations (AP data) – but *well-drained soils* are best**
  - **Water control – reliability of supply is key**
  - **Labor availability for initial use**
  - **Motivation of farmers (and support staff) – need to overcome skepticism**
- **Is SRI scale-sensitive or scale-neutral?**
  - **More advantageous for small farmers**
  - **But *no limitation on scale* -- AP example: 40 ha of contiguous SRI fields → 11.15 t/ha**

Questions: Willem Janssen

- **How compatible with other resource-saving technologies? e.g. zero-tillage?**
  - **No incompatibilities identified so far**
  - **ZT-SRI combination in China, Cambodia**
  - **Cover crops/green manures suitable too**
  - **Linking intensification with diversification**
- **What institutional implications of SRI?**
  - **Moving toward *'post-modern agriculture'*?**
  - **More farmer-centered research?**
  - **More farmer-to-farmer extension?**
  - **Irrigation Depts. > Agriculture Depts.?**

Farmer Innovation Is Important

- New and better implements – are reducing SRI labor requirements
- New and better methods of crop establishment – also saving labor
- Extrapolation of SRI concepts and practices to other crops
- Farmer-to-farmer dissemination has been essential for SRI's spread

SRI Seeder Developed in Cuba

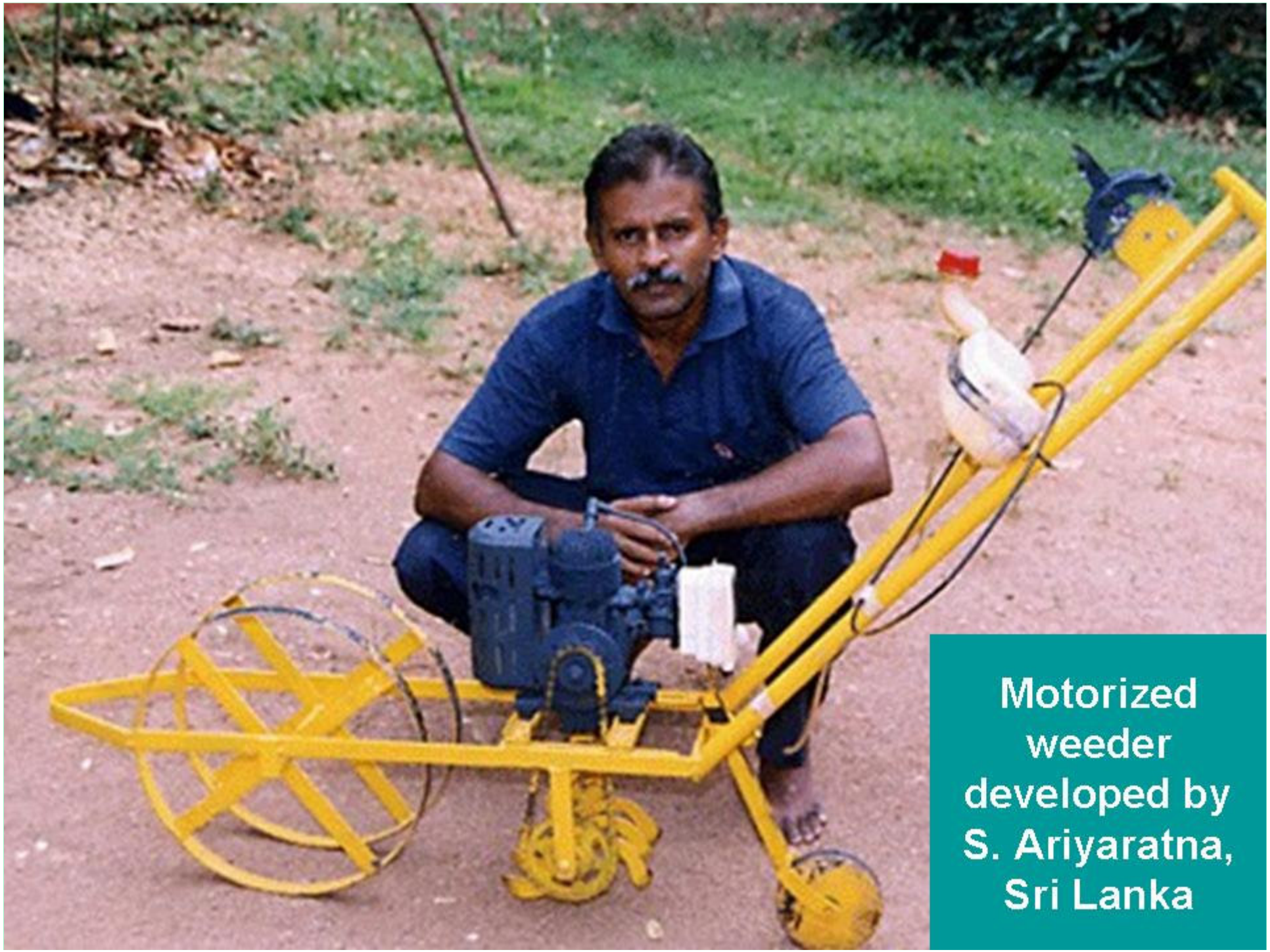
Designed/built by Luis Romero (14 t/ha), 40x40 cm spacing -- too wide; his neighbor built 12-row seeder to be ox-drawn

Roller-marker devised by Lakshmana Reddy, East Godavari, AP, India, to save time in transplanting operations; Reddy's yield in 2003-04 rabi season was 17.25 t/ha paddy (dry wt)


Cono-weeder designed by
H. M. Premaratna, Sri Lanka,
locally manufactured for $10

Weeder designed by Nong Sovann, Kampong Spreu province, Cambodia; built for $3, with a $20 increase in value of rice

Four-row weeder developed by Gopal Swaminathan, Cauvery Delta, Tamil Nadu, India; who also devised the *Kadiramangalam* version of SRI for production in high-temperature regions



Motorized weeder developed by S. Ariyaratna, Sri Lanka

Liu Zhibin, Meishan, Sichuan province, China, standing in his raised-bed, no-till SRI field; measured yield was 13.4 t/ha; his SRI yield in 2001 was 16 t/ha, setting Sichuan record

Winter wheat crop (Poland) before going into winter dormancy

Sugar Cane Adaptation

- **Andhra Pradesh State, India:** Farmer adaptation based on SRI experience:
- Instead of planting 8-12” sets in rows 3’ apart -- incubate 3” sets (with one bud each) in plastic bags and compost, in warm, humid environment for 45 days; plant 1’ apart in rows 5-6’ apart -- **reduce material by 85%**
- Save cost of 3 irrigations and 1 herbicide
- Yield is **100 tons/acre** instead of **30 tons**

G. Swaminathan work on cotton:
Seedlings are planted in cups,
1 acre = 1 cup of hybrid seed
At 10 days, the bottom of cup is removed; seedlings are planted at spacing of 2 x 4 foot + mulching
Yield 20% more, less weed problem, reduced watering, and less cost

H. M. Premaratna, Mellawellana, Sri Lanka, trained >4,000 farmers on SRI at own expense; now working for Oxfam

Mey Som, the first Cambodian farmer to use SRI; now known as ‘the professor’ for his extensive SRI training efforts

COSTS OF CULTIVATION PER HECTARE – TNAU STUDY

Practices	Tractor hours @ Rs. 150 / hr		Bullock pair @ Rs. 200 / hr		Men's Labour @ Rs. 40 / man-day		Women's Labour @ Rs. 40 / man-day		Cost (Rs.)	
	Conv.	SRI	Con	SRI	Conv	SRI	Conv.	SRI	Conv.	SRI
Nursery Preparation	1	-	-	-	6	3	0.5	5.5	2,110	681
Main Field Preparation	7.5	7.5	2	2	12	12	-	-	2,005	2,005
Manures & Fertilizers	-	-	-	-	7	7	10	10	7,254	7,254
Transplanting	-	-	-	-	5	5	55	75	2,400	3,200
Weeding	-	-	-	-	-	38	80	-	3,200	1,520
Irrigation	-	-	-	-	7.5	6	-	-	300	240
Plant Protection	-	-	-	-	2	2	2	2	660	660
Harvesting	1	1	-	-	12.5	12.5	75	75	3,500	3,500
Total	9.5	8.5	2	2	52	85.5	222.5	167.5	21,429	19,060

Cost saving in SRI system over conventional system = Rs. 2,369 (11 %)

RAINFED/UPLAND SRI

Report from PRADAN team, Purulia district, West Bengal, India:

Working with very poor households in rainfed communities, high food insecurity

Program was evaluated in 2004 by IWMI-India Program (Sinha and Talati, 2005):

- SRI use had gone **from 4 to 150 households** within three seasons
- **Returns/ha were increased by 67%**, without full use of SRI methods
- **8% reduction in labor requirements**
- Top yield reached **15 t/ha** -- phenomenal

Average productivity (tons/hectare)	**2.2**
Average productivity of SRI intervention (tons/hectare)	**7.7**

:

Yield Range (t/ha)	No. of families	%
1 to 3	5	3.1
3 to 5	13	8.0
5 to 7	48	29.4
7 to 9	52	31.9
9 to 11	33	20.2
>11	12	7.4
TOTAL	163	100

RAINFED/UPLAND SRI

Report from Farmer Field School program of the Metta Development Foundation, Kachin State, northern Myanmar:

2001-2003: 258 FFSs with 5,202 trainees

By end of 2005: > 20,000 SRI users

FFS methodology particularly relevant for SRI and appropriate fit between agronomic and dissemination strategies

Average FFS study-field yields, 2001-2003

		Rice yields (tons per hectare)		
Year	**FFSs**	**Baseline**	**FFS yield**	**Increase**
2001	**10**	**2.1**	**5.4**	**158%**
2002	**10**	**1.9**	**6.7**	**257%**
2003	**10**	**2.2**	**7.1**	**216%**
Mean		**2.1**	**6.4**	**210%**

Mean rice production increase per FFS family over three years, 2002-2004

Year	(N)	Production of rice per family		
		Before FFS	After FFS	Added yield
2002	202	2,188	4,152	1,964
2003	198	1,948	4,186	2,237
2004	212	1,995	4,218	2,185
2002-04	612	2,043	4,186	2,129

Costs of production and net return of farmers in real terms (kg of rice/ha), 2002-2004

Year	(N)	Production cost (kg/ha)			Rice yields (kg/ha)		Net income (kg/ha)		
		Before FFS	After FFS	% Change	Before FFS	After FFS	Before FFS	After FFS	Increase
2002	202	1,865	1,791	-4.0	2,084	5,422	219	3,631	3,412
2003	198	1,713	1,797	4.9	1,882	6,723	169	4,926	4,757
2004	212	1,794	1,798	0.2	2,249	7,104	455	5,306	4,852
Mean	612	1,791	1,795	0.2	2,076	6,425	285	4,630	4,346

Cost to produce one ton of rice before and after FFS (in kg)

FFS Sites	2002			2003			2004			2002-2004		
	(N)	B	A	*(N)*	B	A	*(N)*	B	A	*(N)*	B	A
Site 1	*24*	870	364	*20*	870	165	*20*	820	279	*64*	853	269
Site 2	*20*	860	337	*18*	860	216	*22*	875	239	*60*	865	264
Site 3	*18*	889	357	*22*	911	212	*20*	1157	513	*60*	986	361
Site 4	*22*	953	365	*20*	941	268	*20*	748	232	*62*	881	288
Site 5	*20*	850	424	*22*	941	449	*24*	1333	644	*66*	1041	506
Site 6	*15*	833	243	*20*	860	337	*19*	785	249	*54*	826	276
Site 7	*23*	833	231	*18*	680	160	*20*	700	198	*61*	738	196
Site 8	*18*	1133	583	*20*	850	338	*25*	569	199	*63*	851	373
Site 9	*23*	900	367	*18*	1400	593	*20*	757	204	*61*	1019	388
Site 10	*19*	974	360	*20*	1160	593	*22*	791	212	*61*	975	388
Ave.	*202*	895	330	*198*	910	267	*212*	798	253	*612*	868	283

B = Before FFS, A = After FFS (N) = number of farmers

Farmers' mean SRI yields of rice on own fields during same year as their FFS training and in the 1-3 years after FFS graduation, through 2004

FFS Years	(N)	Ave. yield (tons/ha) in year of FFS	(N)	Yields (tons/ha) in years after graduation		
				Year 1	Year 2	Year 3
2001	41	3.75	202	4.27	4.47	4.54
2002	35	3.56	198	4.08	4.64	--
2003	33	4.07	212	4.76	--	--

Yield improvements associated with use of improved practices learned in FFS, separately and together with other practices, in year after FFS

Practices (and % of farmers adopting them)	N	% increase in yield over baseline yield before FFS					
		1	2	3	4	5	6
Better variety only (5%)	6	18.33					
Higher quality seed only (15%)	18		27.66				
Higher quality seed + better variety (15%)	18			68.88			
SRI only (13%)	16				142.50		
Better variety + SRI (8%)	10					184.00	
Higher quality seed + SRI (35%)	44					188.64	
Higher quality seed + better variety + SRI (10%)	12						253.33
Significance (subset for alpha = .05)	124	1.000	1.000	1.000	1.000	0.223	1.000

Number of non-FFS farmers associated with the 2001 FFS cohort and their production increases (in percent), 2002-2004

FSS Sites	FFS farmers		Plus Non-FFS Farmers					
	(N)	2002	(N)	2002	(N)	2003	(N)	2004
Nawng Hkying	24	82%	20	50%	32	45%	46	43%
10 Miles	20	95%	25	39%	35	42%	42	40%
Gat Sha Yang	18	102%	15	40%	22	45%	30	42%
N-gan	22	147%	23	60%	28	49%	32	50%
Nawng Hkyi	20	59%	30	45%	38	43%	48	52%
Gara Yang	15	87%	26	45%	39	45%	51	43%
Ja Pu	23	74%	32	34%	38	37%	49	38%
Awng Mye Tit	18	100%	26	61%	35	56%	47	51%
Mai Sak Pa	23	76%	23	45%	32	48%	43	50%
Lawa Yang	19	105%	18	68%	29	65%	38	63%
Mean	20	90%	24	49%	33	48%	43	47%
Total	218		252		361		419	

Percent of farmers in Kachin communities benefiting from FFS

	Percentage of farmers of a community benefiting from FFS			
FFS Sites	1st year	2nd year	3rd year	4th year
Nawng Hkying	34	63	80	100
10 Miles	31	69	85	95
Gat Sha Yang	36	66	80	96
N-gan	40	82	91	98
Nawng Hkyi	29	74	85	100
Gara Yang	23	62	82	100
Ja Pu	32	76	85	100
Awng Mye Tit	27	66	79	97
Mai Sak Pa	35	70	83	100
Lawa Yang	33	64	83	98
Mean	32	69	83	98