

SRI Cultivation in Andhra Pradesh: Positive Evidence on Yield and GHG Effects but Problems of Adoption

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Outline of the Paper

I. System of Rice Intensification (SRI): Evidence on Superiority

- ❖ International Experience

II. Evidence from Field Study in A.P.

- ❖ SRI: Yield and Cost Advantages
- ❖ SRI: Reduced Green House Gases (GHGs)

III. 'Progress' of SRI in Andhra Pradesh (A.P)

- ❖ Agencies involved in SRI in A.P.
- ❖ A Case Study of NGO (CROPS) Role in SRI
- ❖ Coverage under SRI in A.P.

IV. Concluding Observations

- ❖ Major constraints

Summary Statement :
Yield, Labour use and GHG of SRI and Traditional HYV Systems

Rice System	GHG - CO₂ EQ	Labour Use	Yield
	(Per Hectare)	(Hrs per Hectare)	(Kgs per Hectare)
SRI (A.P.)	10232	1014	7609
Traditional HYV (A.P.)	13980	1445	4834
Difference of SRI Compared to Traditional HYV	-3748	-431	277.5
% Difference	-26.81	-29.82	57.41

GHG-CO₂ EQ : Green House Gas Emissions in Carbon dioxide Equivalent
Source : Field Study in Jangaon, A.P.

KgCO₂ – Equivalent of GHG in Paddy

Rice System	Seed	Seed bed Creation	Cultivation	Fertiliser	Pesticides	FYM	Ground Water Irrigation	CH4 soil derived	Nitrous oxide (N ₂ O) soil derived	Harvest	Storage	Total
I Per Tonne												
SRI (A.P.)	1	67	17	73	0	63	353	640	172	8	-43	1351
Traditional HYV (A.P.)	8	129	19	158	3	90	1050	1335	140	7	-107	2833
II Per Hectare												
SRI (A.P.)	8	414	130	548	4	478	2747	4865	1310	58	-330	10232
Traditional HYV (A.P.)	39	554	92	786	18	447	5309	6534	696	32	-525	13980

Per Hectare			
	Methane (CH₄)	Nitrous Oxide (N₂O)	Total GHG
Difference Between SRI and Traditional HYV	-1669	614	-3748
% Difference	-25.54	88.21	-26.81

Labour use in Paddy Cultivation
(Hours per Hectare)

S. No.	Rice System	Family Labour			Hired Labour			Total Labour		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1.	SRI (AP)	408	253	661 (65.19)	97	256	353	505	509	1014
2.	Traditional HYV (AP)	406	251	657 (45.47)	91	696	787	497	947	1445
3.	Difference in the labour use in SRI	Negl.	Negl.	Negl.	6	-440	-434	8	-438	-431
4.	% of the Difference	Negl.	Negl.	Negl.	6.6	-63.22	-55.15	1.61	-46.25	-29.83

Rice Yield Rates under SRI

Year	Season	Number of Demonstration plots organised	Yield in SRI Paddy kg/ha	Yield in conventional Paddy/kg ha	SRI yield difference over conventional	
					Kg/ha	%
1	2	3	4	5	6	7
2003-04	Kharif	69	8,358	4,887	3,471	41.5
	Rabi	476	7,917	5,479	2,438	31.8
2004-05	Kharif	599	7,310	5,561	1,749	24
	Rabi	311	7,310	5,777	1,533	21
2005-06	Kharif	2,864	7,476	5,451	2,025	27
	Rabi	12,277	7,390	5,620	1,770	24
2006-07	Kharif	7,653	6,724	5,005	1,719	25.6
	Rabi	6,201	6,830	5,558	1,272	18.6
2007-08	Kharif	1334	6179	4965	1214	24.45
	Rabi	1293	6650	5225	1425	27.2

Note: The results are from the demonstration farms in A.P. Information after 2007-08 is not available.

Source: Department of Agriculture, Government of Andhra Pradesh.

SRI in Andhra Pradesh: Organisations Promoting SRI in Andhra Pradesh

Sno	Category of Actors	Organisations
1	State Agencies	WALAMTARI, NABARD, NFSM, CMSA, Agros, I&CAD, DRR, ATMA and Dept. of Agriculture, GoAP
2	Research Institutions	AcharyaRanga Agricultural University (AP), CRRI, IRRI, DRR, ICRISAT, IWMI, Rice Research Station (Warangal), KVKs, RSS,
2	Non-State bodies: National	CSA, CWS, SDTT
3	Non-State bodies: International	WWF, Oxfam, SIDA, SDC
4	Local Organisations: NGOs in AP	Timbaku Collectives, WASSAN, CROPS, RDT, APDAI, Jala Spandana, Laya, many other local NGOs at grassroot level
5	Individuals (officials and progressive farmers)	Ajay Kallam, Narayana Reddy, Mandava Krishna Rao

Note: For expansion of abbreviated names of organisations see Annexure of Acronyms at the end of the paper.

Source: Authors' compilation.

Acreage Covered under CMSA in Andhra Pradesh

Sno	District	2008-09	2009-10	2010-11	2011-12
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
1	Adilabad	18.0	80.0	43.0	233.0
2	Ananthapur	182.0	70.0	572.0	1487.0
3	Chittoor	6.0	73.0	273.0	1826.2
4	East Godavari	0.0	0.0	45.0	217.0
5	Guntur	2.0	25.0	162.0	808.0
6	Kadapa	18.0	65.0	55.0	603.2
7	Karimnagar	30.0	92.0	85.0	1240.0
8	Khammam	19.5	60.0	114.0	924.0
9	Krishna	0.0	0.0	23.0	23.0
10	Kurnool	5.0	50.0	91.0	238.0
11	Mahabubnagar	265.0	510.0	2247.0	0.0
12	Medak	297.0	975.0	1200.0	1599.0
13	Nalgonda	9.5	80.0	8.0	529.0
14	Nellore	0.0	170.0	172.0	142.0
15	Nizamabad	14.5	65.0	632.0	685.0
16	Prakasam	0.0	10.0	23.0	81.0
17	Ranga Reddy	2.5	50.0	130.0	38.0
18	Srikakulam	7.5	60.0	139.0	567.0
19	Vishakapatnam	24.0	65.0	186.0	2767.0
20	Vizianagaram	44.4	85.0	211.0	540.0
21	Warangal	152.0	600.0	800.0	674.0
22	West Godavari	0.0	20.0	85.0	677.0
AP		1096.9	3205.0	7296.0	15875.4

Note: 1. Figures in acres; 2. CMSA – Community Managed Sustainable Agriculture.

Source: CMSA, Government of Andhra Pradesh.

NABARD's Efforts on SRI Promotion in A.P

S.No	Details	India	AP
1	2	3	4
1	No of Projects	150	17
2	No of Farmers Targeted for SRI	84000	9240
3	Target Area (in Hec) under SRI	28800	3172
4	No of Villages	2400	334
5	FTTF Grant (Rs. lakh)	2568.00	282.85

Note: FTTF - Farmers' Technology Transfer Fund.

Source: NABARD Regional Office, Hyderabad.

NGO (CROPS) initiative for SRI

Season	No of Farmers and Area under different projects							
	WWF		ICRISAT		NABARD		Total	
	Farmers	Area	Farmers	Area	Farmers	Area	Farmers	Area
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
Rabi 2007-08	120	86	-	-	-	-	120	86
Kharif 2008	143	110	-	-	-	-	143	110
Rabi 2008-09	466	354	96	77.5	-	-	562	431.5
Kharif 2009	334	201.5	98	65.5	-	-	432	267
Rabi 2009-10	649	407.5	212	117	-	-	861	524.5
Kharif 2010	674	353.75	1142	371	-	-	1816	724.75
Rabi 2010-11	906	540	1928	1022	-	-	2834	1562
Kharif 2011	-	-	-	-	460	230	460	230
Rabi 2011-12	-	-	-	-	800	600	800	600

Note: 1 Farmers in number; Area in acres; 2. '-' indicates none.

Source: CROPS, Jangaon, Warangal District, Andhra Pradesh.

SRI Promoting Activities of CROPS

- Motivation of farmers;
- Educated and enthusiastic farmers have been trained to act as master trainers for farmer groups and Farmer Field Schools. Each master trainer is attached to a group of 25-30 farmers
- Organising training programs on the principles and practices involved in SRI method of paddy cultivation;
- Organising exposure visit;
- As part of communication strategy in the newly identified project villages wall writings at the important public places have been done with messages of SRI practices, SRI extension material published with the support of supporting organisation (WWF-ICRISAT project, NABARD) has been distributed;
- Films on SRI have been screened for spreading the awareness on SRI practices;
- ***Kaljatha*** (local folk media) programs were organized in the villages to promote BMP and disseminate information about SRI paddy;
- Data on water, fertilizer and pesticide application was collected regularly;
- Strengthening of linkages established with local government agriculture staff.
- Creating awareness among all the family members about SRI method and among the school children, though pamphlets/booklets and other IEC material.

Source: CROPS.

Size of Holdings and SRI: CROPS Sample

Season/Year	Area under SRI (acres)			% of SRI Farmers by Size of SRI Area				Total SRI Farmers
	Minimum	Maximum	Average	Below 0.5 acre	0.5 to less than 1 acre	1 to 2 acres	2 acres and above	
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
Rabi 2007-08	0.50	1.0	0.73	49.2	50.8	0.0	0.0	120
Kharif 2008	0.25	2.0	0.78	48.3	44.8	7.0	0.0	143
Rabi 2008-09	0.25	3.0	0.89	38.8	51.2	9.1	0.8	121
Kharif 2009	-	-	-	-	-	-	-	-
Rabi 2009-10	0.20	3.0	0.62	58.0	27.8	14.0	0.2	457
Karif 2010	0.20	2.5	0.84	-	-	-	-	-
Rabi 2010-11	-	-	-	-	-	-	-	-
Kharif 2011	0.25	3.0	0.50					
Rabi 2011-12	0.25	1.5	0.70	-	-	-	-	-

Note: ‘ - ’ Not Available.

Source: CROPS.

Extent of SRI in Andhra Pradesh

Year	Rice area covered (in 000Hec)			Area underSRI(in Hec)			% of SRI in Total Area under Rice
	Kharif	Rabi	Total	Kharif	Rabi	Total	
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
2003-04	2,109	866	2,975	28	190	218	Negligible
2004-05	2,215	871	3,086	240	2,451	2,691	Negligible
2005-06	2,526	1,456	3,982	1,127	6,306	7,433	0.19
2006-07	2,641	1,337	3,978	3,061	2,480	5,541	0.14
2007-08	NA	NA	NA	NA	NA	NA	NA
2008-09	2,803	1,584	4,387	NA	NA	NA	NA
2009-10	2,063	1,378	3,441	NA	NA	NA	NA
2010-11	2,922	1,830	4,752	44,794	46,664	91,458	1.90
2011-12	NA	NA	NA	49,496	72,320	1,21,815	2.60*

Note: 'NA' not available. *Assuming 2010-11 area under rice.

Source: Department of Agriculture, Government of Andhra Pradesh.

Concluding Observations

I. Inherent Constraints

- ❖ Rigid Time-bound Operations Regime
- ❖ Mismatch between Erratic Monsoon and Exact Sowing Regime
- ❖ Constraints associated with Markers and Weeders
- ❖ Control of irrigation and draining

II. Policy Constraints

- ❖ Absence of R & D efforts for breeding appropriate varieties to overcome the rigid short-duration transplanting schedule.
- ❖ Failure to invest in the development of simple mechanised ones that would remove the psychological strain from using the current designs of weeders.
- ❖ Failure to develop a major agricultural extension programme for SRI.
- ❖ Political resistance to adopt a framework to integrate training in SRI practices with NREGS so as to overcome certain perceived skill deficiencies etc.