

THE SPREAD OF THE SYSTEM OF RICE INTENSIFICATION IN A  
NETWORK IN ANDHRA PRADESH, INDIA

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ABSTRACT

The spread of innovation is often understood in the context of farmers' adoption and dis-adoption. In this paper we try to understand the spread of innovation at levels higher than that of the farmer, i.e. at the level of policy, academia and research. The system of rice intensification (SRI) (heavily contested among rice scientists) is used as a case-study for this research. This paper seeks to examine the process of SRI in Andhra Pradesh, India. The data collection methods used consisted of interviews, discussions and a secondary literature review. Data were then analysed through life history analysis and content analysis. This paper suggests that the formation of a heterogeneous 'support network' which transcends the conventional agricultural networks

played a crucial role in the spreading of SRI. Amongst others, this network seems to have strategically mobilised the mass media to represent SRI in a positive manner.

**KEY WORDS:** *DIFFUSION, INNOVATION, SUPPORT NETWORK, MOBILIZED*

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## INTRODUCTION AND OBJECTIVES

The spread of agricultural innovation is often understood from the farmer's perspective by measuring the adoption and dis-adoption dynamics. In this paper we approach the spread of innovation from a different perspective. We examined the spread of an innovation, not at the farmer's level but at the level of the policy-makers, academics, scientists, development practitioners and extension workers. We have chosen this trajectory because recent innovation literature emphasises the importance of an above-farmer's level support network as a necessary precondition for adoption at farmer's level. Support network refers to the linkages and coalition between the different aspects of the innovation (Leeuwis, 2000; Leeuwis, 2004). In order to become successful, innovative ideas require a support network (Schot and Geels, 2008; Klerkx *et al.*, 2009; Leeuwis and Aarts, 2011). It is argued that innovative ideas can only be applied if they are aligned with, and supported by, new social relationships, including new formal or informal rules, incentive structures, organisational forms and control systems (Rip, 1995; Schot and Geels, 2008). The case of the system of rice intensification (SRI) is researched as it is said to receive worldwide recognition. At this point it is worthwhile to take a closer look at SRI. The SRI was developed in Madagascar in the 1980s (Laulanié, 1993; Uphoff, 2003; Gujja, 2007b). SRI is claimed to be a novel, sustainable,

appropriate methodology of rice cultivation (Glover, 2011a). SRI methodology of rice cultivation includes the use of young seedlings, single seedlings, wide spacing, aerobic soil management, limited irrigation, mechanical weeding and the use of organic manures (Stoop *et al.*, 2002; Gujja, 2007a; Prabha *et al.*, 2011; Uphoff *et al.*, 2011). It has been reported that SRI uses substantially less water and other inputs while at the same time produces a significant increase in yield and productivity, in comparison with the conventional method of rice cultivation (Ceesay *et al.*, 2007; Satyanarayana *et al.*, 2007; Senthilkumar *et al.*, 2008; Uphoff *et al.*, 2008; Thakur *et al.*, 2009; Africare *et al.*, 2010; Ceesay, 2011; Kassam *et al.*, 2011; Thakur *et al.*, 2011a; Thakur *et al.*, 2011b; Uphoff *et al.*, 2011). The scientific rationality of SRI has created a serious debate among rice scientists (Glover, 2011b; Glover, 2011c). A group of rice scientists considers the claims about SRI to be anecdotal and not backed up by sound scientific explanation, whereas another group of scientists positioned in this debate are diametrically opposite to the former (Stoop *et al.*, 2002; Moser and Barrett, 2003; Dobermann, 2004; Hengsdijk and Bindraban, 2004; Satyanarayana, 2004; Sheehy *et al.*, 2004; Sinclair and Cassman, 2004; Surridge, 2004; Sheehy *et al.*, 2005; Stoop and Kassam, 2005; McDonald *et al.*, 2006; Mishra *et al.*, 2006; Moser and Barrett, 2006; Kabir and Uphoff, 2007; McDonald *et al.*, 2008; Uphoff *et al.*, 2008; Stoop

*et al.*, 2009). Research and extension of SRI is being conducted in more than forty countries in the world (Basu, 2009). Researchers on SRI from many of these countries have already published peer reviewed articles on SRI (Latif *et al.*, 2005; Mao *et al.*, 2008; Namara *et al.*, 2008; Latif *et al.*, 2009; Sanjeevanie Ginigaddara and Ranamukhaarachchi, 2009; Miyazato *et al.*, 2010; Sooksa-Nguan *et al.*, 2010; Hameed *et al.*, 2011; Mati *et al.*, 2011; Sato *et al.*, 2011; Sharif, 2011; Styger *et al.*, 2011a; Styger *et al.*, 2011b; Thomas and Ramzi, 2011).

The wave of SRI also arrived in India a decade ago. Apart from the farmer's experience (ICRISAT-WWF Project, 2008; Adusumilli and Bhagya Laxmi, 2010), SRI has created a debate within policy circles (Ahluwalia, 2011; Department of Agriculture and Cooperation Ministry of Agriculture, Government of India, 2007; Department of Agriculture and Cooperation Ministry of Agriculture, Government of India, 2009; Directorate of Rice Research, 2009).

In this paper we discuss the history of SRI and its subsequent representation in the mass media, including newspapers and websites. Different features of the SRI support network are considered in the Discussion and Conclusions section. The following question guided the whole study: how was SRI adopted in the above-farmer's level in Andhra Pradesh, India?



## **MATERIALS, METHODS AND DATA SOURCES**

A number of methodological issues were taken into consideration while doing the research and these are described below.

### **Research strategy**

The spread of SRI in India is a process which started some years ago and involved a series of sequential incidents and events. The main research strategy which has been used is to critically analyse the involvement of a different set of actors and critical critical events during the initial days of SRI in India in order to gain information about the spreading mechanism.

### **Data collection**

Data collection started with reviews of a number of different websites such as:

- <http://sri.ciifad.cornell.edu/index.html>
- <http://www.sri-india.net>
- <http://www.wassan.org/sri>
- <http://sdtt-sri.org>

Articles published in different journals such as *Field Crops Research*, *Agricultural Systems*, *Experimental Agriculture* and *Agricultural Economics* helped us to understand the ongoing debate on SRI. Another major source of literature came from the newspaper archives. Articles on SRI published in *The Hindu*, the national newspaper, of India were also analysed. *The Hindu* newspaper was selected because of its large circulation base in southern India, and its

broad range of coverage on agricultural issues, when compared to other newspapers. Reports from research institutes, NGOs, international organisations, and reports from conferences, seminars and agricultural universities also constituted a large base for the secondary literature.

The primary sources of data came from the informal interviews (15), focused interviews (6) and group discussions (5) which took place during the field work at Hyderabad.

### **Data analysis**

The unit of analysis for this research was the process of spreading and the unit of observation was mainly different actors who were involved in the spreading process. The contents of written documents were coded and analysed in accordance with the research problems. Following Prasad (2006), critical events that took place in the process of the spread of SRI were elicited from the interviews and group discussions. Analysis of content and life histories provided information for the conclusions.

## **RESULTS**

In this section we outline the data in a coherent and sequential way to construct the life history of SRI in Andhra Pradesh<sup>3</sup> and to highlight the chronology of SRI spreading. The analysis of newspaper and website content is also outlined here. Further discussions and conclusions presented are derived from this section.

### **Life history of SRI in Andhra Pradesh**

The first SRI experiment in India was carried out by organic farmers in Pondicherry after reading an article on SRI by Justin Rabenandrasana in 1999 (Rabenandrasana, 1999; Prasad, 2006). Dr Ajay Kallam, the then director and commissioner of agriculture of Andhra Pradesh discussed the issue of SRI in the Krishna district in 2000 and published an article on the topic in the monthly journal of the Department of Agriculture in 2001 (Kallam, 2001; Prasad, 2006). Influenced by a farmer's heavily tilled rice plant through single seedling in a farmer's festival, the then director of extension Dr Satyanarayana became interested in SRI in 2003 (Basu, 2009). This was followed by an exposure visit of Dr Satyanarayana and his colleague Dr Jalapati Rao to Sri Lanka to get first-hand information on SRI which was funded by Dr Norman Uphoff on behalf of Cornell International Institute for Food Agriculture and Development (CIIFAD) (Basu, 2009). Soon after this visit, with the permission from higher authorities, Dr Satyanarayana made front-line demonstrations (FLD) through the District Agricultural Advisory and Transfer of Technology Centres (DAATTC) and Krishi Vignan Kendra on SRI, which reported substantial yield increase and a considerable

<sup>3</sup> Please see Basu (2009, pp. 46–51) for details of articles analysed.



decrease in water input (Basu, 2009). Dr Satyanarayana's experience with SRI was published in *Annadata* – one of the most popular farmer's magazines in Andhra Pradesh (Prasad, 2006). In March 2004, Dr Satyanarayana responded to an article which criticised SRI, entitled 'Feast or Famine' published in *Nature* with his own experiences and results from India (Satyanarayana, 2004; SurrIDGE, 2004).

Later in this year the Government of India allotted funds for organising 800 demonstrations on SRI through the State of Andhra Pradesh. At the same time, the Indian Council of Agricultural Research (ICAR) funded another 250 front-line demonstrations on SRI through Acharya N.G. Ranga Agricultural University (ANGRAU). The Government of India also asked ANGRAU to train the State liaison officers in SRI for other States. During the 2004 Kharif season, a government order provided training in SRI to farmers in Andhra Pradesh. In this season SRI accounted for 10,000 acres of land for rice cultivation in Andhra Pradesh (Prasad, 2006). Dr Satyanarayana delivered a presentation on SRI to the Directorate of Rice Research (DRR-ICAR) in October 2004 and subsequently the idea of SRI was also conveyed to the World Wide Fund for Nature (WWF) at WWF-ICRISAT project in Hyderabad (Basu, 2009). WWF were interested in SRI as a means of conserving water in the mid Godavari basin (Basu, 2009) as their aim was to conserve water resources and

maintain the ground-water table. WWF and ANGRAU became involved in a partnership to popularise SRI by conducting research on SRI in different situations (Basu, 2009). In 2005 the Water and Land Management Training and Research Institute (WALAMTARI) conducted its first training programme in SRI for master farmers who had already adopted SRI and trained other farmers (Prasad, 2006). Watershed Support Services and Activities Network (WASSAN) took the lead on weeder design, based on the experiences and inputs from farmers (Basu, 2009). WWF-ANGRAU partnership arranged a visit of the then chief minister of Andhra Pradesh to an SRI farm which resulted in 40 million INR being set aside to popularise this method (Prasad, 2006; Basu, 2009).

WWF, along with the SRI farmers participated in the rice and water dialogue which took place at IRRI in 2006. In the same year DRR organised a training programme in SRI for State agricultural officials. This was followed by a national symposium on SRI organised jointly by DRR, ANGRAU, WWF and the Society for Advancement of Rice Research at ANGRAU Hyderabad. In the following years a national symposium on SRI was organised in Tripura and Tamil Nadu, respectively, with assistance from Sir Dorabji Tata Trust (SDTT) and National Bank for Agriculture and Rural Development (NABARD). In the following years SRI became a growth area for both SDTT and NABARD. In May 2009, interactive policy dialogue on up-scaling of SRI was held at the

ANGRAU campus, in collaboration with the DRR. This policy-dialogue session was attended by people from the planning commission, directors from National Food Security Mission (NFSM), chief secretaries from other rice growing States and promoters of SRI. At this meeting the planning commission advised on minimum SRI principles (Directorate of Rice Research *et al.*, 2006; Prasad, 2006; Basu, 2009; Directorate of Rice Research, 2009).

### **Media analysis**

While collecting the data (from secondary literature and interviews), it became clear that media representation of SRI activities is an integral part of the support network. The activities of the support network are regularly published in the newspapers as well as on the different specialised websites of SRI.

During 2004–2009, 47 newspaper articles were found in *The Hindu* newspaper. The articles were further analysed by content analysis method as described by the Colorado State University (undated) to understand the trends of the articles.

The analysis of the 47 articles indicates several recurring key words and phrases on SRI. Most articles contain phrases such as: 'much less input required' (referring usually to seeds, fertilisers and/or labour), 'less pests and diseases', 'minimum use of pesticides', 'higher quality of grains', 'high yields' or 'high production' and 'requires far less water'.



Thirty-five of the 47 articles we examined suggested that SRI confers the following three key advantages: water saving, reduced input requirements and increased yields. The quantitative figures associated with these reported advantages varied enormously. On input reduction, for example, percentages mentioned varied from 15% to 50%. Similar percentages were mentioned in relation to yield increases and water savings. Only one of the articles mentioned the disadvantages of SRI. Such disadvantages were mentioned regularly by respondents during interviews, who referred to, for example, the high labour demands of SRI, the need for regular weeding, and problems with the availability of organic manure and limitations regarding water control. We can conclude that SRI was presented in a very favourable way and without considering practical constraints and/or critical scientific reports on SRI. Furthermore, it was mentioned in nine articles that SRI originates from Madagascar.

The majority of the articles were written by the staff correspondents and staff reporters who mainly published two things: examples of the success of SRI and quoted words and views of senior agricultural officials such as the Director of Agriculture, Deputy Director of Agriculture, etc. The words which were quoted by these senior officials often either advised farmers to take up SRI or expressed their plans for promotion of SRI. A considerable part of those articles also

highlighted statistics of total acreage under SRI and these statistics often indicated increased levels of adoption.

There exist several specialised websites which offer regular updated news on SRI activities. This research is done by people who are above-farmers' level such as scientists, policy-makers, extension workers, etc. For this set of people, accessing websites and internet is an easy medium to get information. Specialised websites on SRI have been found:

- <http://sri.ciifad.cornell.edu/index.html>
- <http://www.sri-india.net>
- <http://www.wassan.org/sri>
- <http://sdtt-sri.org>
- <http://info.worldbank.org/etools/docs/library/245848/index.html><sup>4</sup>

The oldest and the most informative website on SRI is <http://sri.ciifad.cornell.edu/index.html>. This website is maintained by CIIFAD and Cornell University under the guidance of Dr Norman Uphoff. Besides providing the historical, methodological and scientific aspects of SRI, it provides a detailed description of different activities and news of SRI from 55 countries around the world. It also makes available a regular update of articles, conference proceedings and symposiums from different countries where SRI has been taken up. The website is organised and easy to access. Almost every article written by Dr Uphoff based on his experience around the world

is available on this website. For a beginner in SRI, this website is a useful resource on SRI in a national and global context.

Similarly the website <http://www.sri-india.net> – which is maintained by WWF-ICRISAT project – offers a detailed scenario of SRI within the Indian context. It provides a detailed account of every State where SRI has been adopted with statistical details. The website also includes video clips on SRI from different TV channels and organisations. A detailed SRI map is also available on this website. Other websites also provide similar information on SRI.

## DISCUSSION AND CONCLUSIONS

In this section we describe different features of the SRI support network.

### Diverse composition of actors and institutions

We found a diverse range of people from a number of different professional backgrounds involved in promoting SRI within the support network. Apart from the key players of the agricultural establishment, such as the agricultural university (ANGRAU), research institutes (DRR, ICAR, DAATTC and Farm Science Centres [Krishi Vigyan Kendra, KVK]) and State agricultural department (Andhra Pradesh agricultural department, NFSM,

<sup>4</sup> Please see Basu (2009, p. 54) for details of the website analysis.



WALAMTARI), we found international/national organisations such as WWF-ICRISAT project, WASSAN, support from national bank (NABARD) and other NGOs working for rural development (SDTT). As a result, the support network for SRI promotion was not confined to the actors of the agricultural establishment but included other actors and institutions. This was because SRI is not limited to improving agricultural productivity but it includes opportunities for water conservation, sustainability, profit maximisation and reducing the electricity demand for agriculture. The latter is a pressing problem in Andhra Pradesh which is why the chief minister was interested in SRI.

### **Role of the champions**

The growing popularity of SRI involved a number of 'champions'. The notion of 'champions' denotes successful, influential and well-designated people in their professions. A recommendation from these people to their respective organisations can help to mobilise considerable resources. The list of champions is long. Below we mention some who played a particularly important role at higher levels. The first is Dr Norman Uphoff, who is a well-recognised academician, researcher and administrator, in his organisation and in several international organisations and ministries. Dr Uphoff financed the visit of senior officials from Andhra Pradesh to Sri Lanka for an exposure visit to get first-hand information on SRI cultivation. Dr

Uphoff also maintained continuous collaboration with the supporters of SRI in Andhra Pradesh. People who worked on SRI in Andhra Pradesh used Dr Uphoff as a medium to share the updates of SRI through the CIIFAD website.

As noted above, Dr Satyanarayana also responded to the critical 'Feast or Famine' *Nature* paper, incorporating results from Andhra Pradesh (Surrige, 2004; Satyanarayana, 2004). This played a key role in the development of SRI in India and in international debates on the subject.

Another important champion in this process is Dr Biksham Gujja, who is a Policy Advisor for global water issues and partnership at WWF. He is based at WWF headquarters in Switzerland and is director of the WWF-ICRISAT water dialogue project. Dr Gujja has played a key role in mobilising financial resources from WWF to SRI projects. Together with his team and with the people working in SRI projects, Dr Gujja convinced the Ministry of Agriculture to include SRI in their NFSM. There are also several other people (scientists, professors, policy-makers and NGO workers) who also contributed considerably to the growth and popularity of SRI in India.

### **By-passing research**

In agricultural extension in India there are a number of formal processes to go through before a new crop variety or management package is released to farmers. The new variety or the new methodology of

crop cultivation must be approved by the ICAR in New Delhi. Then it will be sent for trial in different agro-climatic zones in India. It is released for commercial cultivation only upon positive feedback from the trials. The process of research evaluation usually takes a considerable time to reach the ultimate beneficiaries. But this has not been the case with SRI extension. After coming back from Sri Lanka, Dr Satyanarayana (with the permission from higher authorities) released the SRI methodology directly at farmer field level. SRI skipped the usual time-consuming process of approval and trials and reached the farmers' level directly. Research on modifications and necessary changes in the methodology was carried out by the DRR-ICAR based on feedback from the farmers. As a result the research regarding SRI was much more attuned with the needs and context of farmers.

### **Resource mobilisation**

The major resources (financial and other) necessary for research and extension of SRI were mobilised from a number of diverse sources. Initially the funding for the exposure visit of Andhra Pradesh agricultural officials to Sri Lanka came from Dr Uphoff on behalf of CIIFAD. WWF provided funding for research, extension, documentation and organising of SRI national symposiums. They also provided funds to DRR-ICAR to conduct a systematic field research study on SRI. Part of the funding was also used to document the benefits



and the methods of SRI. A number of books, brochures and reports on SRI were published by the WWF-ICRISAT project. WWF-ICRISAT also maintained a website on SRI. Three national symposiums on SRI were organised jointly by several organisations such as ANGRAU, DRR-ICAR, NABARD, WASSAN and SDTT. The Chief Minister of Andhra Pradesh was another source of money for SRI.

### Media

Our analysis of the articles on SRI in *The Hindu* newspaper from 2004 to 2009 suggests that SRI has been represented in a rather biased manner. Positive dimensions were highlighted and existing constraints and disadvantages were ignored. SRI has been represented as a desirable cultivation system from the perspective of agricultural policy-makers and as a ‘success story’ from the perspective of farmers. The positive reporting style on SRI is quite striking, not least since ‘negative’ stories tend to be considered more newsworthy than ‘positive stories’. Interestingly, in the same period, no other newspaper articles were written on the introduction of new technologies for rice production. In fact, most publications on agriculture were related to economic, political and price issues or to the drama of farmer suicides; technology was not a regular topic (apart from SRI and the genetic modification controversy around BT cotton). Given the broad readership of *The Hindu*, and the known

potential of mass media to influence farmer awareness and interest (Leeuwis, 2004; Rogers, 1983; van den Ban and Hawkins, 1996) it is likely that the representation of SRI in the mass media has contributed to its spread, both indirectly (further development of the SRI support network) and directly (by shaping farmers’ views and awareness).

The website content analysis showed that websites provide information (including a variety of promotion materials) relevant to scientists, policy-makers, extension staff and farmers. The CIIFAD-Cornell website provides a detailed and regularly updated overview of different activities, news and articles on SRI from 55 countries around the world. This website is not only informative, but also effectively shows that people with an interest in SRI should not feel alone, and are (or can become) part of a large and growing international community.

### Policy implications

It is difficult to infer concrete policy implications for other extension and advisory contexts since our study is based on limited empirical investigation. However, our study poses some critical questions that policy makers and extension workers must contemplate before designing any extension programme. The first question is: do policy makers pay enough attention to coalition building during the extension of innovation? Recent literature on extension of innovation indicates the importance of above-farmer’s level coalition-building as a

necessary precondition for its adoption at farmer’s level. In line with this, our study showed that the existence of a heterogeneous support network at above-farmer’s level was important for the promotion of SRI. The second important issue is: what will be the composition of such coalitions? In this study we argued that the composition of the network was extremely diverse in nature – thus attracting complementary support from varied sources. The composition of coalition in our case transcends beyond the traditional agricultural sector and includes political agents, national banks, NGOs and water conservation institutes. As agriculture is a multifunctional activity, agricultural innovations – implicitly or explicitly, directly or indirectly and formally or informally – must relate to its larger social, political, economic and environmental dimensions, while building the above-farmer’s level coalition. The final question is: do the extension policies sufficiently plan media strategies? Our research indicates that an effective media strategy for SRI extension existed. There were regular updates regarding adoption, research, and events in a reputed national English language daily newspapers. Moreover, specialised SRI websites were designed to provide information regarding the methodology, research, adoption, and specific success stories, in a global context. In short, it was very easy for various audiences to find all necessary information on SRI through the internet.



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