

Promotion of Systems of Rice Intensification in Madurai district of Tamil Nadu

S.Kumar, N.S.Venkatraman and K.Mahendrakumar, KVK Madurai, Tamil Nadu

Introduction

Systems of Rice Intensification (SRI) are one of the improved rice production technologies that were introduced through the On Farm Testing in Madurai District during 2005 – 06 by KVK Madurai. Before the implementation of the programme, farmers were well explained since the technology was found to be incompatible with the existing cultivation practices, Initially they raised queries about the rationale of using of 8 kg of seed to cover one hectare of area, while they were using 80 kg of seeds and Transplanting of young seedlings that too at age of 12 – 14 days old while they transplant 28 – 35 days old seedlings. The use of cone weeder and square planting appear to them as novel idea and they questioned its practical application. In this scenario with much persuasion, few farmers were convinced by promising them that if there was any failure that will be duly suitably compensated. In this condition, a marginal farmer Thodichi of Mayandipatty who is owing only one acre of land had offered 30 cents of land for SRI trials.

SRI - Methodology

A mat nursery was established in her field with ADT43 with 1.5 kg of seeds On 15.6.2005. The raised seedling was trasplanted through line planting at the interval of 22.5 cm between the plant and 22.5 cm between the line on 28.6.2005 by the family members of thodichi as the labourers were not accustomed in handling young seedlings, Thodichi was advised to maintain the field for one more week as that of nursery and to avoid flooding of field since three is a chance for uprooting of plants and possibility of seedling mortality, However, against our wish, heavy shed of rain fall had occurred on 29.6.2005 and flooding situation had happened in the field, To our wonder even in that situation the seedlings thrived well, Subsequently weeding through mechanical weeders were carried out on 15, 25, 35 days after transplanting, As the operation of rotary weeder in muddy clay condition was found to be difficulty and it could not pull out the grown up weeds, conoweeder was introduced on second and third weedings. At the time of weeding the tillers were counted and it was found that 8, 16, 35 number of tillers per hill were noticed on 15th 25th and 35th days respectively. Though the fourth weeding has to be done on 45th day it could not be practice because of

lesser space between the plants, hence it was decided to conduct future trails in 25 x 25cm spacing. This field was given with nitrogenous fertilisers only once following the leaf colour chart, whereas in the conventional method at least thrice the nitrogenous fertilizers would have been applied that might fetch additional cost as well as unwarranted pest infestations. Only mild occurrence of leaf roller was noticed and the same was controlled by spraying of neem based pesticides namely nimbecidin. In these 30 cents of land she could harvest 13 bags of rice or otherwise she used to harvest 9 – 10 bags. In her calculation, she could harvest 8 tonnes per hectare which is 25 percent higher than the conventional method. In her experience she could earn an additional income of 10000 per hectare by adopting SRI techniques.

Looking at the healthy crop stand and the bumper harvest, neighbours of this village came forward in the next season to conduct the same trials in their field. In the next season the rest of the trials were conducted at progressive farmer's field namely E.M.S.Raju, from Thindiyur, Rasuthevar from Kinnimangalam, Veluthevar from Vedarpuliankulam, Nagaraju from Mettuunerathan and Ramasamy from Katakulam of different villages and here too an average yield of 8.1 tonnes / hectare was recorded. However, in their experience they found difficulties in square marking by using rope and they requested to find out a suitable device to make a square marking. In this regard KVK Madurai has appraised the various literatures and experience of some innovative farmers. In this effort, it was found that Parthasarathi of Melanachikulam has invented a crude device for marking. Further working on the device a rolling marker which could mark 25x25 cm square marking was fabricated. Subsequently in the year 2005 – 06 this device was put in to use through the On Farm Trials trails.

Developing rolling markers for paddy transplanting

In SRI, proper spacing in the planting of seedlings is one of the essential principles underlying the technology. A spacing of 25 x 25 cm in a uniform square pattern is normally adopted. However practical adaptability of planting single seedling in square method becomes very tedious under field conditions and farmers find it difficult to mark the recommended spacing with the conventional method of using rope as marker.

To overcome this constraint, the Krishi Vigyan Kendra, Madurai has developed a handy implement, the rolling marker. This marker when rolled on wet paddy field makes uniform square impressions. The uniform spacing stamped by the rolling marker facilitates

easy operation of cono / rotary weeders. This implement is very handy, easy to operate, does not require skilled labour and is economical. Above all it reduces the human drudgery of square planting which prevent the farmers from adopting SRI method of cultivation.

The rolling marker consists of (i). A cylindrical contraption (or marker) rotating along an axial rod. (ii). A metallic handle (manually pulled) to facilitate rolling of the marker.

The cylindrical contraption has rods welded together so as to form square or triangular impressions when rolled on the wet paddy field. The handle is attached to the central axial rod and when manually pulled helps in rolling the marker. The rolling marker has been designed with three optional marking types viz. square, triangular and oblong.

The following drawings help in understanding the invention. All drawings pertain to Standard Square / triangular type rolling markers.

Fig.1 shows the isometric view of the square type rolling marker with the cylindrical marker (1) and the handle (2) as per this invention.

Fig. 2 shows the front (1) and side view (2) of the cylindrical marker (square type) part of the standard rolling marker.

Fig. 3 shows the front (1) and side view (2) of the cylindrical marker (triangle type) part of the standard rolling marker.

From **Fig.1**, it can be seen that the rolling marker comprises of a cylindrical contraption (marker) **1** and a handle **2** to facilitate rolling of the marker by pulling the invention. The cylindrical marker has rods welded together so as to form square or triangular impressions when rolled on the wet paddy field. The whole contraption is mounted on a central rod. The handle which is made of metallic rod is attached to the cylindrical marker through a set of bushes that rotate freely at the ends of the central axial rod.

The **Fig.2** shows the front **1** and side view **2** of the cylindrical marker (square type) part of the standard rolling marker. The rods are arranged and welded together so as to form squares of 25 x 25 cm when rolled on the wet paddy field. The standard square type cylindrical marker comprises of 6 square formations and the width of the cylindrical marker is 1.5 m (6 x 25 cm). One complete roll of the marker makes 4 sets of square impressions on the field and the cross-sectional diameter of the cylindrical marker is 31.8 cm.

The **Fig.3** shows the front **1** and side view **2** of the cylindrical marker (triangle type) part of the standard rolling marker. The rods are arranged and welded together so as to form triangles of sides 25 cm when rolled on the wet paddy field. The standard triangle type cylindrical marker comprises of 6 triangle formations and the width of the cylindrical marker is 1.5 m (6 x 25 cm).

An improvement over the existing square planting in SRI is the adoption of zigzag planting which still reduces the competition and easy usage of the cono / rotary weeders. To easily adopt zigzag planting, modified triangular rolling marker has also been developed and evaluated under field conditions. This more advantageous method of zigzag planting cannot be adopted using the conventional rope marking and can only be followed using triangular roller markers. For effective marking of square or triangular impressions, after puddling and perfect levelling, the paddy field has to be completely drained before transplanting. Trials conducted comparing triangular planting over square planting revealed an increase of 15 per cent in tillering. The cost of using ropes for marking involves Rs. 320 per acre whereas with rolling marker the cost is only Rs. 20 per acre. Farmers felt that this implement is very handy, easy to operate, economical and does not require skilled labour.

The rolling markers which were used in farmers field demands some precautionary measures to put it in operation. They are

1. Field must be levelled uniformly
2. Proper drainage facilities must be ensured
3. Water should be drained in the previous day of transplanting

However, during monsoon period these conditions can not be obtained, there is a difficulty in marking. Moreover sliding during operation was observed and hence necessary modification was made and bal barring was fixed in connecting the shaft with handle for gentle operation.

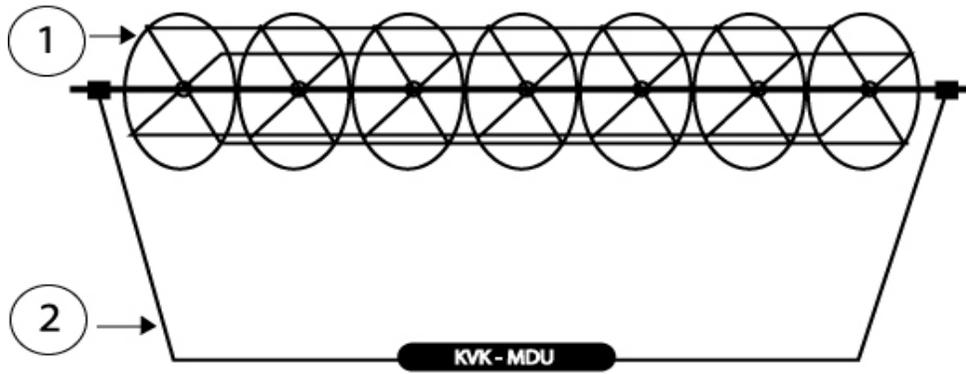


Fig. 1

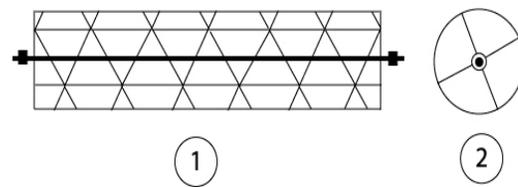
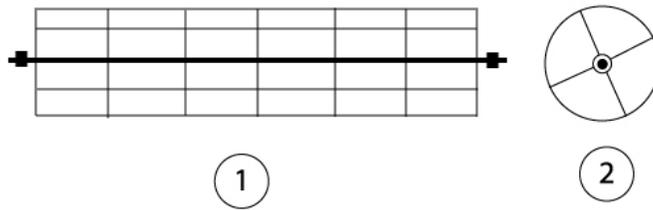
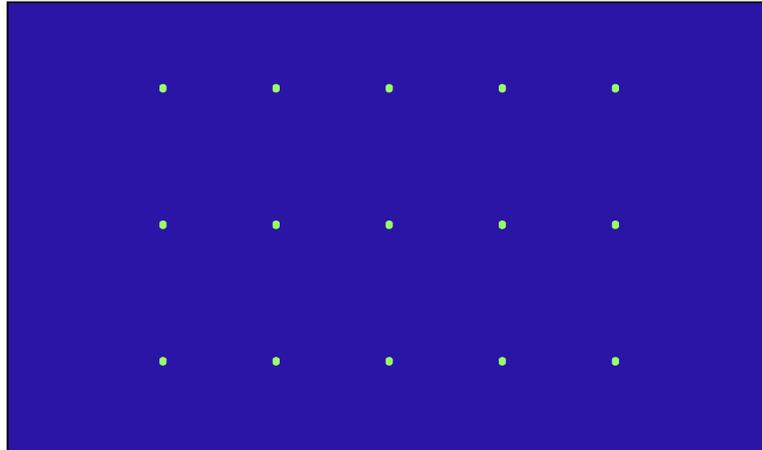
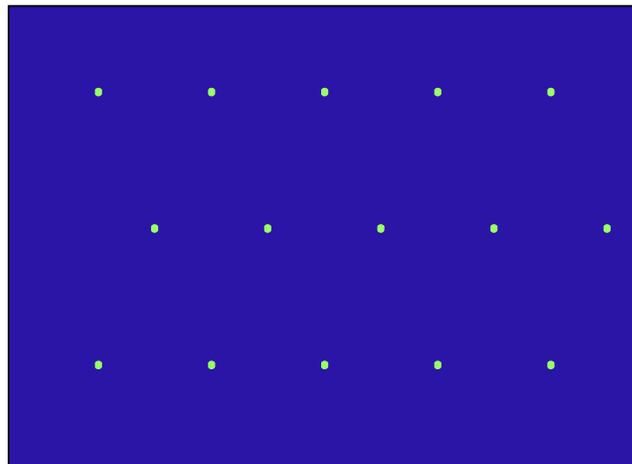


Fig.3

Rolling marker

Square method – 25cm x 25cm (25 seedlings /sq.m)



Triangle method – 25cm x 25cm (23 seedlings /sq.m)



Rolling marker –triangle type

Table 1. Results of On Farm Trials on Efficacy of using Trapezium rolling marker in SRI

Technology Assessed / Refined	*Production per unit tonnes/ha	Net Return (Profit) in Rs. / ha	BCR
Technology option 1 (Farmer's practice) Manual sowing	5.0	11000	1.52
Technology option 2 Line sowing	7.5	19000	2.22
Technology option 3 Trapezium rolling marker	7.8	22000	2.25

Results of assessment

- ❖ Labour saving
- ❖ Weeding is easy
- ❖ Pest and disease damage is less
- ❖ More yield

Feedback from the farmer

- ❖ Easy for planting
- ❖ Weeding is easy
- ❖ Less number of weeds
- ❖ More number of tillers and grains
- ❖ More yield

Block demonstration on SRI

After gaining sufficient expertise in SRI through OFT, it was decided to popularise this break through in rice production technology through various means. Accordingly during 2006 – 07, 72 block demonstration on SRI on area of 72 hectare was demonstrated in the farmer's field. Here the critical inputs viz., conoweeder, rotary marker and LCC chart were provided to the farmers and the result of such demo are presented below

Table 2. Summary of demonstration on ICDP Block Demonstration

S. No	Particulars	Details / Values
1.	Total no. of Demo. conducted in area	72 hectare
2.	Variety / Hybrid	ADT 36 and ADT 43

3.	Average yield of check control plot (t/ha)	6.8
4.	Average yield of Demo.(t/ha)	8.25
5.	Difference in average yield of Demo (t/ha).	1.45
6.	% increase over control average yield	11.8

Motorized weeder for SRI

Front Line Demonstration and block demonstration of SRI, farmer's found difficulty in operation of using mechanized weeders. In the operation of Rotary weeder, the grown up weeds could not be removed properly though the physical handling of weeder is easy. However, in the muddy clay soil, the tip of rotary weeder get stuck up. Though in the operation of conoweeder the soil got tilled deeply and the weeds are uprooted thoroughly and the farmers found it very hard to operate and it gave pain in chest and hands. To overcome these constraints, KVK Madurai has ventured in developing motorized weeder for SRI through On Farm Trials.

Table 3. Economic analysis of technology assessment

S. No	Technology Assessed / Refined	*Production per unit tonnes/ha	Net Return (Profit) in Rs. / unit	BCR
1	Technology option 1 (Farmer's practice) Manual weeding	5.0	15000	1.36
2	Technology option 2 Long handed weeder	5.2	16000	1.25
3	Technology option 3 Power weeder	5.5	17000	1.15

Results of assessment

- ❖ It covers more area compared to manual weeding
- ❖ Less number of labourers
- ❖ Plant damage is less
- ❖ Fuel consumption is low

Feedback from the farmer

- ❖ Cover more area compared to manual weeding
- ❖ Need alternate fuel or battery operated weeder
- ❖ Efficiency is more and involve less labour
- ❖ Rotary wheels are not move in clayey soil and sink in soil

Refinement to be made

- ❖ Rotary wheels have to be designed and separated drive wheels has to be fixed to move easily in clayey soil. For this garden land motorized weeder was modified and was put it in use .How ever the fuel efficiency was found to be very low and cost of operation was found to be higher.

Extension activities

About 150 extension activities including 54 training programmes to the farmers, 32 field days, 40 group meetings, 50 lectures to the farmers were undertaken in Madurai district. In addition on this topic, 2000 folders and 500 booklets were distributed to the farmers. Scientists have made 200 visits to the farmer's fields and had interactions with the farmers.

Impact

Direct Impact

- ❖ 13200 ha area has been brought under the SRI
- ❖ 200 no of farmers were supplied with rolling marker
- ❖ 25 percent of total cultivatable areas under rice are permanently brought under SRI
- ❖ Farmer's are earning additional income of Rs 10,000 per hectare through SRI
- ❖ Thandavan Engineertng work Mellur is regularly producing marker as well as cono weeder as per the technical knowledge impart by KVK, Madurai. Further, this firm is earning an income of Rs 20,000/ month by making the rotary marker alone.

Indirect Impact

- ❖ Due to the operation of cono weeder the soil get gathered around the hill and the crop could stand firmly in the soil and hence, the harvest loss got minimized.
- ❖ Labours saving to the extend of 10 to 20% was observed
- ❖ More area has been brought under rice cultivation

- ❖ The cost reduction in plant protection measures was noticed.
- ❖ crop damage by rats were meagre due to wider space.

Indirect impact

SRI and rat control

In Metu Neerathan Village of Vadipatti taluk, yield loss in rice field due to rat incidence was 2 per cent and it has consistently increased every year and the yield loss reached up to 60 per cent in the year 2005. It was reported that some of the farmers had total crop loss and they did not take up harvest operation. When the scientists of KVK approached the village for OFT programme on SRI, the villagers staged a guiro and were reluctant to participate in any extension activities in the village.

In this situation with much persuasion OFT was conducted on SRI in Mr. Nagarajan's field. While other farmers realized a yield loss of 10 to 40 percent due to rat damage, in Mr. Nagarajan's field the same was meagre due to wider space. Subsequently, rat eradication campaign was conducted on 16.02.06 and 60 farmers participated in it. The farmers shared their experiences about the success of rat eradication programme that led to yield increase by 20 per cent.

Summary

KVK Madurai introduced Systems of Rice Intensification (SRI) technique in their district and popularized the same through Technology Assessment and Refinement (TAR) and demonstrations. SRI technique realized an additional yield of 1.45 t/ha, which is an important result to sustain the depleting paddy cultivation.