

Direct Seeding with Drum Seeder – Future Prospects

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The System of Rice Intensification (SRI) has greatly expanded after its introduction in Chittoor district, thanks to the number of articles, bulletins and various publications of SRI promoters, scientists and practitioners, which impressed many farmers in the district about SRI. **RASS-Acharya Ranga KVK** had taken the lead to promote SRI methodology among rice farmers through various extension efforts. Sensitization programmes covering all the 66 mandals of the district; demonstrations and guidance to the farming community on about 90 acres covering 12 mandals; exposure visits, field days, supply of conoweeders and markers free of cost to villages on a community usage basis; publications, etc. were undertaken by the KVK to promote SRI in Chittoor district.

During the first 3 years after 2003, KVK identified many farmers interested to adopt SRI, and 20% of them have repeatedly practiced it for more than 5 seasons. In spite of impressive potential in SRI over traditional practice in terms of water saving and yield, however, common problems like greater labour requirement, especially for weeding, have become a hindrance for wider adoptability of SRI. The transplanting of rice seedlings which is a highly labour-intensive and expensive operation can be replaced by direct seeding that can reduce labour needs by more than 20 per cent in terms of working hours required (Pradhan, 1969; Santhi *et al.*, 1998.).

The grassroots problems that are preventing rapid spread of SRI as identified by the KVK are:

A majority of the extension workers are literally informed about the SRI package but they have a dearth of hands-on experience.

1. First timers for SRI need continuous guidance technically and operationally from the extension workers, starting from raising a nursery, marking the field, transplanting, weeding, etc., which is not happening in many cases. Extension workers could not devote that much time to SRI instruction due to their regular duties.
2. First timers for SRI need a continuous guidance technically and operationally from the extension workers starting from rising nursery, marking the field, transplanting, weeding etc which is not happening in many cases. Extension workers could not devote that much time due to their regular duties.
3. The National Rural Employment Guarantee Programme (NREGP), on the other side, has caused greater constraints in the availability of agricultural labour for regular farm operations. In this context, SRI which demands technically and energetically-sound labour is unable to survive and it requires changed attitudes of both regular SRI practitioners as well as new takers.

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4. There is not much progress on the researchable issues in SRI even after five years of its acceptance by Indian farmers.
5. SRI demands more organic inputs, which are not available at field level for farmers. In some areas, the cost on organic inputs is more than inorganic inputs.
6. Farmers, especially big farmers, depend on hired labour, and the requirement of more labour inputs and continuous monitoring of the field is making them reluctant to take SRI in large areas.
7. Non-practicability on problematic soils, under canal irrigation, etc. is also limiting the wide spread of SRI practices.

In this context, KVK Chittoor endeavored to develop direct seeding for rice according to SRI principles with the help of a drum seeder in Madibaka village, Yerpedu mandal, Chittoor district in Rabi season 2006 and Kharif 2007. Three treatments were laid out simultaneously -- traditional practice (T1), SRI (T2), and direct seeding with a drum-seeder (T3) – to assess the pros and cons of the alternative technology.

Details of the direct-seeding technology (on per-acre basis):

1. Seed rate required - 15 kg
2. Time required for direct seeding - 120 minutes (2 hours)
3. Labour required - 3 persons [one for pulling the drum seeder, one to help the puller to lift the machine at the end of the field, and one to fill/refill the seed in the drums].
4. Weedicide use is a must, and if needed (in fields where weed problem is high), a second application at 30 days after sowing is also done in addition to the first application made within 2 days after sowing.
5. Sprouted paddy seeds are filled to 3/4 level in each of 4 drums, and once the seedr is pulled, seeds fall in 8 rows @ 20 cm width between the rows.
6. Conoweeders for SRI use are slightly modified to fit into the 20cm gap between rows, and they are run across the field 3-4 times, starting from 20 days after sowing.

Differences between conventional, SRI and direct-seeding methods

Results of trials conducted during Rabi 2006 (per acre)

Particulars	Traditional	SRI method	Direct seeding
Seed rate	30 - 40 kg	2 kg	15 kg
Days to transplant	30 - 40 days nursery	8 - 12 days nursery	0 days
Cost of nursery (Rs)	1,200	200	0
Labour required for trans-planting /seeding operation	20	15	2

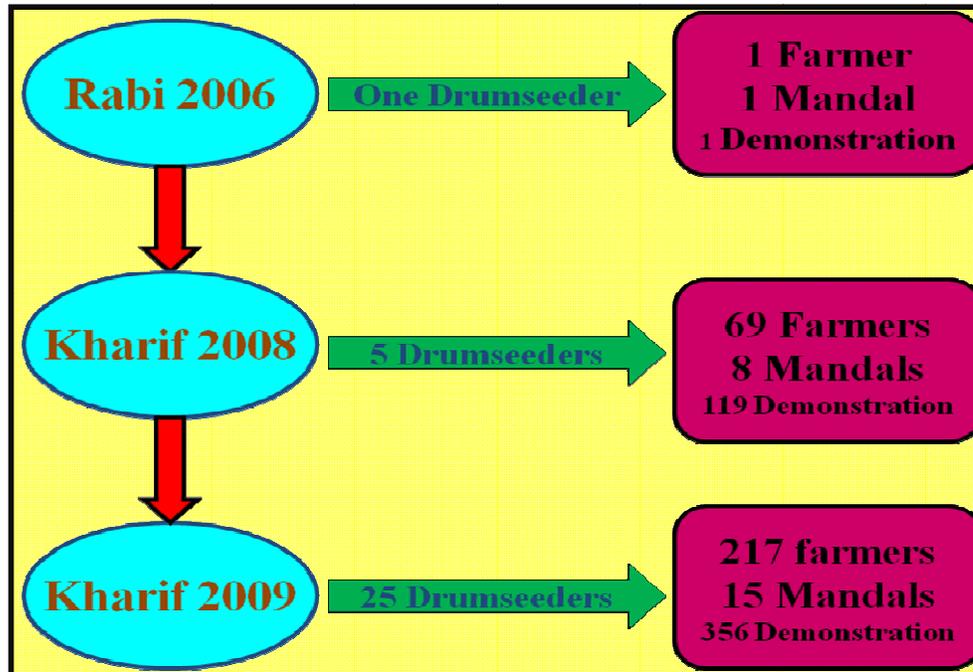
Spacing	Zigzag method	25 x 25 cm	20 x 5-8 cm
Water management	5 cm or more standing water from the day of transplantation to 10 days before harvesting	No standing water after transplantation stage; alternate wetting and drying only. The field is kept wet until panicle initiation stage, and from then on, 2-3 cm standing water till 10 days before harvesting.	No standing water after seeding. The field is kept wet until panicle initiation stage and from then on 2-3 cm standing water until 10 days before harvesting.
Weed management	Manual weeding twice (or) some apply of weedicides 1 st time and manual weeding 2 nd time.	Incorporation of weeds into the soil using conoweeder in both directions (N-S and E-W) One manual weeding with 3-4 labourers is sufficient.	Weedicide is a must once or twice. Butachlor just 1-2 days after seeding, and if necessary 2.4-D. Sodium salt application at 30-35 days after seeding. Conoweeder is run in one direction only, either E-W or N-S, i.e., in the direction in which the drum-seeder was pulled.
Yield recovered	2,625 kg/acre	3,525 kg/acre	3,375 kg/acre
Total cost of cultivation	Rs. 9700/acre	Rs. 9500/acre	Rs. 8300/acre
Gross returns @ Rs.400/bag of 75 kg	Rs. 14000/-	Rs. 18800/-	Rs. 18000/-
Net returns per acre	Rs. 4300/-	Rs. 9300	Rs. 9700/-
Benefit-cost ratio	1.44	1.97	2.16

The farmers who conducted this trial and the rest of the farmers who closely observed it are very much convinced about this technology, especially in terms of tiller development, yield potential, and benefit-cost ratio. Shekar and Singh (1991) have stated that direct seeding of sprouted seeds under puddled condition results in significant improvement in yield attributes like number of effective tillers and grain yield.

Spread of the direct-seeding technology in Chittoor district of Andhra Pradesh

The KVK introduced an 8-row paddy row seeder (also called drum-seeder) made of fibre from KSNM Marketing, Coimbatore, during Rabi season 2006. After the success of the trial conducted in the field of Sri Nageswara Rao, Madibaka village, Yerpedu mandal, Chittoor district, the KVK introduced five more drum-seeders in the district during Kharif 2008.

By Kharif 2009, 25 drum-seeders were placed in different villages so that practicing farmers in that area could use the machine free of cost. With financial support from the Agricultural Technology Management Agency (ATMA), Chittoor KVK has purchased 15 drum-seeders and has placed one machine at each division of the Asst. Director of Agriculture's (ADA) area. In total, there are 11 drum-seeders in 11 ADA divisions. All the drum-seeders are used by the farmers on community basis free of cost.



as on 31st December 2009

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The KVK has modified the existing conoweeder using for SRI method by reducing the width of wheels to 12.5 cm. Since the size of the conoweeder wheels is reduced, this reduces the drudgery involved in operating the conoweeder in the field very much. This is one of the reasons for wide adoption of this technology by farmers. During training programmes, the KVK does not emphasize the yield advantage of direct seeding method over traditional system so much as sensitizing farmers to the advantages of reducing amount and cost of labour and greater ease of cultivation.

The critical factors aided in gaining the confidence of the farmers are:

1. Direct seeding method avoids any raising of nursery, pulling up seedlings and transplanting them so that labour requirement for crop establishment is negligible. Due to the Employment Guarantee Scheme (EGS) for the rural unemployed labourers which offers Rs.80/day, the demand for agricultural labour is at its peak during planting time, forcing farmers to pay high wages for regular field operations.
2. Farmers can take up paddy cultivation at any time, right away, as there is no requirement or delay of raising a nursery.
3. Paddy cultivation using direct seeding method can be taken up in fields which have heavy weed infestation, although this means that weedicide application is a must.
4. Labour requirement for operating the conoweeder is reduced by 50% compared to SRI methodology since it is run in one direction only. The major hurdle in adoption of SRI methods, i.e., drudgery of conoweeder operation, is overcome by direct-seeding method.
5. Farmers are of the opinion that they will be satisfied even if they just achieve normal yield with the drum-seeding technology because they will save about Rs.1,400-1,500 per acre in costs incurred for raising nursery and transplantation. Fortunately, in many of the demonstrations so far, the yield is on par or more than that obtained in traditional system.
6. Operating the conoweeder (with 15cm width of wheels) is easy compared to that used for SRI method (25 cm width).
7. Duration of the crop is found to be reduced by 7-10 days compared to traditional practice. Wang and Sun (1990) also noticed that duration can be shortened by 7-15 days in direct-seeded rice compared to transplanted rice.

Sri K. Purushottam Naidu of Mittur village of Ramachandrapuram mandal, a practitioner of direct-seeding method, was adjudged to be the best rice farmer in the district for 2008 and was awarded an amount of Rs. 5,000/- by the Honorable Minister of Andhra Pradesh State Smt. G.Aruna Kumari.

Summation of demonstrations on 35 ha in Chittoor district (2009)

Particulars	Traditional method of transplanting	Direct seeding
Seed rate	30-40 kg	15 kg
Days to transplant	30 - 40 days nursery	0 days
Cost of raising nursery (Rs)	1,500	0
Labour required for transplanting	20	1
No of effective tillers / sq. meter	13	15
No. of grains / panicle	165	186
Average yield (Kg/acre)	2,540	2,636
Total cost of cultivation / acre (Rs.)	13,222	11,037
Gross returns @ Rs. 800/bag of 75 kg	22,013	22,845
Net returns per acre (Rs.)	8,791	11,808
Benefit cost ratio	1.66	2.06

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Glimpses of direct seeding technology adopted in Chittoor district



Filling of pre-germinated paddy seed into the drums



Pulling the drum-seeder in the puddled field without any standing water



Seed dropped from the drum-seeder is seen in rows of 20cm width



Direct-seeded plot 20 days after sowing



Modified conoweeder with two wheels, each of 12.5 cm width, to fit into 20 cm row spacing of direct-seeded rice



Direct-seeded plot 40 days after sowing



Direct-seeded paddy ready to harvest



Dr. L. G. Giri Rao, Director of Extension, ANGRAU, visiting the direct-seeded rice demonstration of KVK



Sri Siva Reddy, Joint Direct of Agriculture, addressing the gathering during a field day organized by KVK in Madibaka



The dru-seeder implement is easy to carry any distance. A single farmer can reach his far-away field quickly and can complete his sowing operation on one acre in just 2-2.5 hours. With traditional transplanting method, a lot of time is wasted by labourers to reach the far-away field itself and their work efficiency is thereby reduced. A single farmer sows **3 acres** with drum-seeder in a half day whereas 15-20 labourers complete transplanting operation in **1 acre** in half day.



Happiness is seen on the face of farmer not only because of easiness of operation but also improved output (grain as well as fodder)



Field day conducted for famers to sensitize them on the direct-seeding technology in paddy production



Exposure visit for farmers



Sri K. Purushottam Naidu of Mittur village, a practitioner of direct-seeding technology, was adjudged to be the best paddy farmer in the district for 2008 for getting high productivity with low investment on inputs