



Dry Converted Wet Direct Seeded Rice

– A Climate Smart Technology



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Rice (*Oryza sativa* L.) is the major staple food crop cultivated annually in an area of around 104.7 lakh acres, under diverse growing environments in all the three Agro-climatic Zones of Telangana state. Majority of the rice crop in the state is grown under wet transplanted situation, transplanted from July second fortnight to August months with the availability of water. However, under situations of late release of water in canals or tanks or less water availability Dry Converted Wet Direct Seeded Rice (DW-DSR) is an alternative technology to transplanted wet land rice (TWR).

Dry direct seeding of rice is gaining momentum in the recent years in Telangana state since transplanting seedlings into puddled soil is labour, water and energy - intensive and is becoming less remunerative as these resources are shrinking and becoming scarce. In addition to labour shortage, increasing labour wages is also driving farmers to convert into dry direct seeding of rice instead of transplanting. It provides an opportunity to take up rice cultivation with the onset of monsoon by selecting a suitable variety without waiting for water availability in tanks, canal commands and or recharge of underground water in bore wells during *khariif*. This technology is not only feasible in labour scarce situations but also avoids transplanting of aged seedlings.



Climate and Soil Requirement:

Areas receiving copious amount of rainfall after seeding (around 200mm/month, particularly in the months of July/August) having heavy textured soils with good water holding capacity are suitable for this system.

Land Preparation:

Seed bed is prepared by ploughing twice with cultivator, followed by rotavator to ensure proper levelling for better seeding, stand establishment and water management.



Land preparation



Sowing with seed drill

Varieties :

All the recommended varieties suitable for the particular climatic conditions can be used for sowing. Long duration varieties with 150 days duration are most suitable for June sowing under this system.

Sowing and Seed rate :

In general, dry converted wet rice sowings will be done during 2nd fortnight of June to 1st fortnight of July as dry direct seeding or with limited rainfall received during this period and crop is allowed to grow under rainfed conditions until water is available for ponding. Sowing can be done either by broadcasting (25 kg ha^{-1}) or line sowing with locally available bullock drawn planter (gorru) or tractor operated seed cum ferti-drill (20 kg ha^{-1}) based on the seed size.



Germination and crop establishment



One month after sowing



Conversion to Wet

Conversion to Wet:

Usually during August month water bodies *viz.*, tanks, reservoirs are filled and water is released. After receipt of irrigation water, the field is converted into flooded rice, there by saving around 15-20 days, which was otherwise lost with conventional transplanted wet land rice.

Nutrient management:

Fertilizer management should be done similar to that of transplanted wet land rice except application of 25% excess Nitrogen. Entire recommended Phosphorous fertilizers and 50% Potash fertilizer should be applied during the last ploughing at the time of sowing. Nitrogen fertilizers should be applied in 3 equal splits, first at 15-20 days after sowing, second at tillering stage and third at panicle initiation stage. Remaining 50% potash fertilizers should be applied along with the third split application of nitrogen fertilizers. However, Zinc and iron deficiencies may appear under this system and the same may be corrected by spraying $\text{ZnSO}_4 @ 2\text{g l}^{-1}$ and $\text{FeSO}_4 @ 5\text{g l}^{-1} + \text{Citric acid} @ 1\text{g l}^{-1}$ twice at 5 days interval, respectively.

Weed Control:

As the land is not flooded with water, weed management is must under DW-DSR system. Pre emergence application of herbicide Pendimethalin 30% EC 2.5-3 l ha⁻¹ within 48 hours of sowing at optimum moisture condition. Post emergence application of Bispyribac sodium 10% SC 250-300 ml or Cyhalofop-Butyl 5.1% + Penoxsulam 1.02% OD 2-2.5 l or Triafamone 20% + Ethoxysulfuron 10% WG 225 g ha⁻¹ at 15-20 days after sowing (at 2-3 leaf stage for broad leaved weeds and when grasses attain 7-10 cm height). If the crop is sown in rows cono weeder/power weeder can be used for weed control.

Pest and Disease Management:

Compared to TWR the incidence of BPH will be less in DW-DSR. However, recommended plant protection measures are to be followed for different pests and diseases on need basis.



Maximum tillering stage



Maturity stage

On-Farm testing of DW-DSR:

The technology was tested through on-farm trials in Vemsoor and Tallada mandals of Khammam district in tail end areas of Nagarjuna Sagar left canal command through Krishi Vigyana Kendra, Wyra. The details of cost of cultivation (Table 1), yield and returns (Table 2) and comparative advantages (Table 3) recorded in on-farm demonstrations are furnished below.

Table 1. Cost of Cultivation (Rs ha⁻¹) of DW-DSR *vis a vis* TWR

S. No	Particulars	DW-DSR	TWR
1	Land preparation	10,000	13,750
2	Seed + Seed Treatment	1125	2750
3	Nursery	-	2500
4	Sowing/Transplantation	1000	12500
5	Weed Management	7500	7250
6	Fertilizer	9188	8438
7	Pesticide	5688	8925
8	Harvesting	7500	7500
	Total	42001	63613

Table 2. Yield, economics and benefits of DW-DSR *vs* TWR

Description of Technology	Benefits	Yield and Economics	DW-DSR	TWR
Dry direct seeding during 2 nd fortnight of June to 1 st fortnight of July and later converted to wet rice system is an alternative technology (DW-DSR) to the conventional system of transplanted wet land rice (TWR).	No need to wait either for monsoon or for the water availability in tanks and canals.	Grain yield (t ha ⁻¹) Cost of Cultivation (Rs ha ⁻¹)	6.60 42,001	6.37 63,613
	15-20 days' time can be saved with sowing of seed in dry soil in anticipation of rains during the month of June.	Gross income (Rs ha ⁻¹)	1,24,080	1,19,850
	The nursery raising and transplanting cost may be saved in DW-DSR.	Net income (Rs ha ⁻¹)	82,079	56,237
	Timely sowing, 25-30% saving in irrigation water without much yield loss can be achieved with this technology over that of transplanted wet land rice.	Benefit Cost ratio	2.95	1.88

Table 3. Comparative advantages of DW-DSR vs TWR

Details	DW-DSR	TWR
Water	25-30% (300-350 mm) of total crop water requirement of 1240 mm could be saved.	-
Labour requirement for crop establishment (man days)	2 (less labour required)	25-30
Crop maturity	7-10 days early	As per duration of variety
Grain Yield	6.60 t ha ⁻¹	6.37 t ha ⁻¹
Saving in cost of cultivation (ha)	Rs.21,612 /-	-
Additional net income (ha)	Rs. 25,842 /-	-
Benefit Cost ratio	2.95:1	1.88:1

The detailed list of farmers involved in DW-DSR demonstrations is given below.

Table 4: On-Farm Yield & Economics of Dry Converted Wet Rice adopted by farmers

S. No	Name of the farmer	Village/Mandal	Area (ha)	Yield (kg ha ⁻¹)	Cost of Cultivation (Rs ha ⁻¹)	Net Returns (Rs ha ⁻¹)
1	Sri. Gorla Venkata Ram Mohan Reddy	Marlapadu/Vemsoor	2.8	6675	42075	83415
2	Sri. Dornala Seetha Reddy	Marlapadu/Vemsoor	3.6	7225	44530	91300
3	Sri. Jonnalagadda Venkatesh	Marlapadu/Vemsoor	0.8	6150	39375	76245
4	Sri. Renta Chinnaiah	Marlapadu/Vemsoor	0.8	6580	43540	80164
5	Sri. Dhane Venkata Krishna	Marlapadu/Vemsoor	0.8	6650	44290	80730
6	Sri. Pilli Subash Chandra Bose	Marlapadu/Vemsoor	1.0	6425	40060	80730
7	Sri. Mandapati Koti Reddy	Marlapadu/Vemsoor	2.4	6825	43425	84885
8	Sri. Bheemireddy Krishna Reddy	Marlapadu/Vemsoor	3.2	7175	44290	90600
9	Sri. Voggu Narashimha Reddy	Kandhukur/Vemsoor	1.6	6825	43475	84835
10	Sri. Bandi Krishna Reddy	Kandhukur/Vemsoor	4.0	6475	42425	79305
11	Sri. Sk.Nagur	Kandhukur/Vemsoor	1.6	6880	45175	84169

S. No	Name of the farmer	Village/Mandal	Area (ha)	Yield (kg ha ⁻¹)	Cost of Cultivation (Rs ha ⁻¹)	Net Returns (Rs ha ⁻¹)
12	Sri. Burgu Nageswara Rao	Kandhukur/Vemsoor	3.2	6775	42390	84980
13	Sri. Cheepi Pulla Rao	Duddepudi/Vemsoor	2.0	6650	44375	80645
14	Sri. Nandikolla Sanjeeva Rao	Duddepudi/Vemsoor	3.6	6275	39850	78120
15	Sri. Miriyala Prabhakar Rao	Duddepudi/Vemsoor	2.8	5950	39060	72800
16	Sri. Jakkampudi Srinivas	Duddepudi/Vemsoor	8.0	6475	41250	80480
17	Sri. Juvva Srinivas	Duddepudi/Vemsoor	7.6	7050	43125	89415
18	Sri. Dirisala Venkata Narasaiah	Kothavenkatagiri/Thallada	3.6	5975	38040	74290
19	Sri. Malyala Gopal Rao	Kothavenkatagiri/Thallada	2.8	6450	38775	82485
20	Sri. Dirisala Satyanarayana	Kothavenkatagiri/Thallada	4.0	6515	40500	81982

Field days organized :

- Field day at Marlapadu (V) of Vemsoor (M) on 07.11.18
- KVK mela at Khammam Bhaktha Ramadasu Kalakshetram on 12.07.19
- Field day at Papatapalli (V) of Khammam Urban (M) on 03.12.19
- Field day at KVK, Wyrā on 07.12.19



Dr. R. Jagadeeshwar, Director of Research, PJTSAU, addressing the farmers in Field day organized at Marlapadu(V), Vemsoor (M) on DW-DSR



Field visit by Dr. M.Venkata Ramana, Principal Scientist (Rice) & Scientists of Institute of Rice Research to dry converted wet rice field



Visit of Sri. R.V. Karnan, District Magistrate & Collector, Khammam to DW-DSR fields

Relevance and scope for upscaling of DW-DSR in Telangana State :

- In Khammam district alone almost an area of 7000 ha is under DW-DSR and about 5800 farmers are adopting this technology.
- This technology can be promoted in the areas where long duration varieties are grown and receiving around 200 mm rainfall in each month (July & Aug) with soils having high water holding capacity, to save precious resources without compromising yield levels.

E-resource material brought out on dry converted wet rice :

- a. You tube videos - <https://youtu.be/bu0gcHlvIHu> ,
<https://youtu.be/FEMBFWrm9Kl>
- b. A blog of MyGov.in (<https://blog.mygov.in/dry-converted-wet-rice-cultivation-an-affordable-alternative/>) , GoI and Jal Shakthi Abhiyan Blog
- c. Tweet made by Smt. Smriti Zubin Irani, Hon'ble Minister of Women and Child Development & Minister of Textiles on Dry Converted Wet Rice technology of Khammam District
- d. <https://youtu.be/DA30-hR2NHY> Aaru thadi paddatilo Vari Sagu

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