



A Case Study

Role of zero tillage in Tungabhadra command area for direct seeded rice, maize and jawar crop

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ABSTRACT : A case study on zero tillage in Tungabhadra Command Area (TBP) in paddy, maize and jawar crop revealed that, in case of direct seeded rice (DSR) for paddy crop, the farmer received good yield of 78.75 q/ha and the yield was compared with normal method of transplanting; it was observed that, the yield data's were at par with each other. In the farmer view, the cost of cultivation has reduced drastically. They could manage to save Rs. 5000/- per acre and 20 per cent water saving as compared to normal method. In case of paddy-maize sequence in *Rabi* season 2011-12, the farmer have got comparatively good yield of 62.5 quintal/ha of maize compared to conventional method and there was almost Rs.4000/- to 5000/- saving in land preparation. In case of paddy-hybrid jawar crop sequence in *Rabi* season 2011-12, the farmer have got comparatively good yield of 55 quintal/ha of hybrid jawar and saved Rs.7000/- per acre compared with normal paddy growing. They expressed that paddy cultivation under normal method got labour intensive and need careful maintenance and observations but in this technology they could able overcome all these problems. In farmers view, because of excessive land preparations like ploughing, harrowing and puddling in case of paddy, leads to deterioration of soil physical properties and ultimately leads to lower yield. The farmers also expressed the constraints faced by them during the growing season that, maize and jawar crops were very sensitive to water logged and saline condition, so it needs land to be leveled good enough. Because of their uneven land, the downstream area was severely affected by water logging and salinity problem. They realized that for avoiding these problems in zero tillage, laser leveling is the only solution.

KEY WORDS : Direct seeded rice (DSR), Zero tillage, Laser leveling

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INTRODUCTION

In India, the problems of soil salinity and water logging are more common in the irrigated tracts of arid and semi-arid regions. The soil salinity is estimated to occupy an area of about 7 million hectares in the country (Bhumbla, 1971). Not

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much information is available on the extent and nature of these problems as no survey of the problem soils has been conducted in the country since long. In Karnataka, most of the salinity-affected area is in the irrigated commands. The extent of damage in the state is reported to be 10 per cent of the total irrigated area. The severely-affected command is the Tungabhadra Project (TBP) Area (26,018 ha), which alone accounts for over 61.4 per cent of the total saline lands in the state. The excessive use of irrigation water in this command area has led to the problems of salinity and water logging. This is also due to several such factors as type of soil, presence of salts in the soil, unscientific water management, cropping pattern and drainage. The problem is more pronounced in the Tungabhadra Command Area due to vertisols; and there also, it is alarmingly severe under the Left Bank Canal of the TBP Area. The area

under irrigation-induced soil degradation in the Left Bank Canal command increased by 68.86 per cent between 1971 (6127 ha) and 1981 (10346 ha) and by 160 per cent between 1971 and 1991 (15971 ha). Based on this increasing trend of soil degradation during the past 30 years, it has been projected that by 2047 AD, the Left Bank Canal command area may become completely degraded due to salinity and water logging.

The irrigation-induced soil degradation has severely impaired the productivity, posing threats to sustainability of the irrigated agriculture and the livelihood of small and marginal farmers. On one hand, the land-base for agriculture has been shrinking and on the other, the productivity levels of land have been declining, causing concern to all the stakeholders.

The Tungabhadra dam and command area work has been initiated in the year of 1954 under the Madras and Hyderabad government. During that period the dam was originally designed for the storage capacity of 3764 million cubic meters. During the course of period, due to siltation, now it has been estimated that the capacity of the Tungabhadra dam has reduced to 2952.822 million cubic meters. Apart from this, violation of cropping system in the command, has led to the non-availability of water for the tail end farmers which in turn is affecting the productivity of crops.

Conservation agriculture:

Conservation agriculture (CA) is about adoption of innovative crop rotation in which crops are planted in minimum, no-till or drastically reduced tillage system with some crop residue retention on the soil surface to reduce unproductive losses of water through evapo-transpiration and control weeds. Thus, CA is a concept for optimizing crop yields, and economic and environmental benefits.

Zero tillage:

Zero till system refers to planting crops with minimum of soil disturbance (Gopal *et al.*, 2010). In this, seeds are placed directly into narrow slits 2-3 cm wide and 4-7 cm deep made with a drill fitted with chisel, "inverted T" or double disc openers without land preparation.

Zero tillage concept which is known to conserve soil moisture by minimizing evaporation losses and reducing the effect of salinity on crop growth. During *Rabi* 2011-12, field demonstrations at selected villages of TBP command area work has been initiated by saline water scheme, ARS, Gangavati. Many farmers show their interest and we were able to spread this technology in an area of 120 acres. The different crops covered under zero tillage in TBP command area are shown in Table 1. We have organized one field day programme on 'Zero tillage in maize and sorghum' at farmers of Siddapur village of TBP command area, where total 120 farmers participated.

Success stories:

The Direct seeded rice farmer, Sri Prakashbabu from Basavapatna village of TBP command area, who has taken paddy-DSR for *Rabi* 2011-12, have got good yield i.e 70 q/ha of paddy (Fig. 1). The farmer from Kampli village Sri Nageshwar Rao, got DSR yield of 78.75 q/ha. The yield was compared with normal method of transplanting; it was observed that, the yield data were at par with each other. In the farmer view, the cost of cultivation has reduced drastically. He could manage to save Rs. 5000/- per acre and 20 per cent water saving as compared to normal method. The farmers expressed their view in field day which was organised by UAS, Raichur and CIMMYT on 31-03-2012 in one of the CA farmer's field at Siddapur that, this technology has got more advantage over conventional method and in turn save water, money and time.

Table 1 : Field Demonstration of conservation agriculture in TBP command area

Sr. No.	Crop	Village	No. of farmers	Area under CA(acres)	Avg. yield (q/ha)
1.	Maize	Basavapatna	3	14	52.5
		Udumkal	1	4	
		Sriramnagar	1	8	
		Siddapur	1	10	
		Gangavati	1	7	
2.	Hy.Jawar	Siddapur	4	47	50
		Gangavati	1	4	
3.	DSR (Paddy)	Basavapatna	1	7	75
		Kampli	1	2	
		Siddapur	1	1	
4.	Green Gram	Kampli	1	2	
5.	Cowpea	ARS, Gangavati	1	8.5	
6.	Bengalgram	ARS, Gangavati	1	3.5	
7.	Bajra	ARS, Gangavati	1	2	
			19	120	



Fig. 1 : DSR in paddy field of Sri. Prakashbabu at Basavapatna

Addressing to the farmers gathering (Fig. 2), he announced that, in next season, he will plan for ten acres DSR at his different fields.



Fig. 2 : Sri Prakashbabu sharing his experience in DSR conservation agriculture at field day

Paddy (DSR) – The advantages and constraints faced by the farmers are

Advantages:

- Time saving of about 20 to 25 days.
- Cost of cultivation is very less.
- At par of yield as compared to the normal method.
- Intensive care is not required, as there is no nursery growing

Constraints:

- Because of the uneven land, non uniformity in the

water distribution and uneven growth.

- Because of the not using of recommended weedicides, failed in weed management.
- Mixing of seed from the earlier crop.

The farmer, Sri Chittubabu from Sriramnager of TBP command area, who has taken paddy-maize sequence for *Rabi* 2011-12, got 62.5 quintal/ha yield of maize (Fig. 3). As per his view, he got comparatively good yield compared to conventional method. Expressing his views in field day



Fig. 3 : Visit of scientist to maize field under CA

organized by UAS, Raichur and CIMMYT on ‘Zero tillage in maize and hy.jawar’ on 31-03-2012 (Fig. 4 and 5), he little bit failed in managing weeds and there was almost Rs.4000/- to 5000/- saving in land preparation. Apart from his visit to London after sowing of maize, he could manage to get good yield. In this context, he expressed that paddy cultivation under normal method got labour intensive and need careful



Plate 4 : Sri Chittubabu, sharing his experience of conservation agriculture in maize at field day



Fig. 5 : Maize sowing under zero tillage at Sriramnagar



Fig. 6 : Sri Shivaraj at his conservation agriculture hybrid jawar field

maintenance/observations but in this technology he could able to overcome all these problems. As per his view, maize is very sensitive to water logged and saline condition, it needs land to be leveled good enough. Because of uneven land, his two acre land was severely affected by water logging and salinity problem. So he realized that, one should go for laser land leveling before conservation agriculture.

Maize with zero tillage – The advantages and constraints faced by the farmers are

Advantages:

- 20-30 per cent water saving.
- Cost of cultivation was very less.
- Time saving
- Less labour oriented
- Good yields as compared to normal method

Constraints:

- Water logging was observed in uneven lands
- Proper weedicide management is required
- At the downstream areas, the drainage channels were required for seepage of water.
- Because of the earlier paddy field, irrigation management should be taken care.

The farmer, Sri Shivaraj from Siddapur village of TBP command area, who has taken 12 acres paddy-hybrid jawar crop sequence for *Rabi* 2011-12 (Fig. 6 and 7), got 55 q/ha yield of hy. Jawar. The farmers from the same village have got an average yield of 45 q/ha. Expressing his CA experience in field day organized by UAS, Raichur and CIMMYT on ‘Zero tillage in maize and hy.jawar’ on 31-03-2012, that he got frustrated for five years in going of paddy-paddy continuously, inturn it led to heavy loss in income and land degradation. Addressing to the gathering (Fig. 8), he told that nowadays the cost of



Fig. 7 : Hybrid jawar in conservation agriculture technology

growing paddy is going high and non reaching of canal water to many fields, ultimately this reasons made him to think for alternate. He also expressed that, he got good yield and he saved nearly Rs.7000/- per acre compared to paddy growing. He also pointed out that, he could have got better yield, if he could have managed water logged condition. Because of the uneven land, the irrigated water staggered and growth of the crop was little bit suffered. He made announcement that he will go for again *Rabi* jawar after *Kharif* paddy in an area of 25 acres after land leveling with laser land leveler.

Hybrid Jawar with zero tillage – The advantages and constraints faced by the farmers were

Advantages:

- Yield was increased 10 q/ha as compared to last year



Fig. 8 : Sri Shivaraj sharing his experience in maize conservation agriculture at field day

normal method

- In case of deficit irrigation water, better option to go for Paddy-Hy. Jawar as compared to paddy-paddy.
- Cost of cultivation was very less.
- Time saving
- Less Labour expenses

Constraints:

- Because of the labour falt in applying of weedicide, failed in managing weeds
- In downstream area, he faced stagnation of water, because of the undulating land
- Bird watching is labourious

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