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Adoption of Self-propelled Rice Transplanters in Raichur Region of Karnataka

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Introduction

Rice is cultivated in an area of about 1.51 million ha in Karnataka with a production of 3.80 million tonnes. Nearly 0.21 m ha of rice area is in the coastal area (Udupi and Mangalore as well as part of Uttar Kannada district) where the average productivity is 2.9 t/ha. Rice crop is mainly sown in two seasons viz. kharif (June-July) and summer (January-February). In all the six rice growing eco-systems, kharif sowing is common while the crop is cultivated mainly in the irrigated areas of north and south during summer season. In the tank-fed areas, the crop is taken up late in the kharif season (August-September) depending upon the monsoon showers. In some parts of coastal area, a second crop is sown in September-October and harvested in January - February and third crop is cultivated between December-January and March-April. In each district, nearly 60-80 per cent of the total area is covered during kharif (wet) season while the remaining area is covered in late kharif and summer (dry) seasons. Irrigated area (North) under rice crop occupies 0.21 m ha with a productivity of 2.53 t/ha. It comprises of Raichur, Bellary, Haveri, Koppal, Dharwad, Gulbarga and Belgaum districts. In kharif season, rice varieties of 140-145 days duration are cultivated while summer crop is cultivated on limited area with short to mid-early duration genotypes.

Traditional Practice of Rice Transplanting

The traditional practice of nursery raising (800 m^2) for rice crop requires about 2.5 to 3.0 times higher seeds (about 75 kg) as compared to mat type nursery raising. The nursery preparation in kharif season generally starts around 25th May by broadcasting seeds manually. The traditional practice needs more labour and water. The labour is engaged for watering for 15 days under traditional practice. The cost of raising mat type nursery and use of suitable rice transplanters in one hectare area is 50% lower as compared to traditional method of nursery preparation and manual transplanting. Sona Masuri/BPT 5204/Samba Masuri rice is grown in Raichur, Bellary, Koppal and part of Kulburgi districts of Karnataka, depending upon availability of irrigation. Sona Masuri rice is also being grown in rabi and summer conditions. There is a gradual decline in yield as the date of sowing gets delayed in manual transplanting from May to June, July and in some cases August. Pest and disease attack is more in manual transplanting. There is a need to adopt self-propelled rice transplanters in Raichur region of Karnataka to overcome these difficulties.

Salient Features of the Machines

Two types of self-propelled transplanters viz. four row walk behind type and six row riding type (Fig. 1a &b) were selected for promoting the mechanized transplanting technology and thereby increase the mechanization level in

rice cultivation. They required mat type nursery for uniform transplanting of the seedlings. In both the machines, there were provisions of safety mechanism, which avoided breakdown of machine parts due to impact against stones and hard surfaces in the field. The automatic depth control helped in maintaining uniform planting depth. The specifications of self-propelled rice transplanters are given in Table 1.

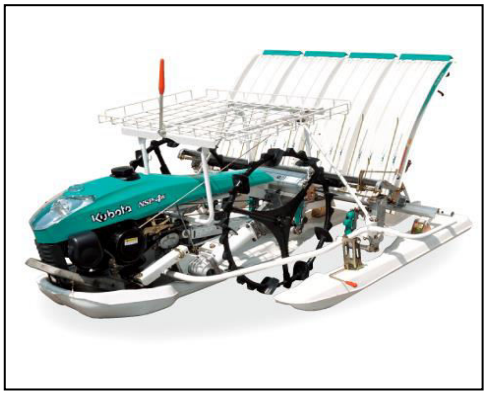

Fig. 1 (a) Four row walk behind type transplanter

Fig. 1 (b) Six row riding type transplanter

Table 1 Specifications of self-propelled rice transplanters

S. No.	Parameters	Details	
1.	Type	Walk behind type	Riding type
2.	Make	Kubota	Kubota
3.	Model	MZ175-B-1	MZ 2100-B-1
4.	Overall dimensions, mm	2140 x 1300 x 910	2140 x 2100 x 1910
5.	Weight , kg	160	260
6.	Unit price, Rs.	2,00,000	9,50,000
7.	Power source	3.2 kW, water-cooled, 4-stroke, petrol engine	15 kW, water-cooled, 4-stroke, petrol engine
8.	Rated width, mm	1200	1800
9.	Number of rows	4	6
10.	Row spacing, mm	300	300
11.	Distance between hills in a row, mm	120 to 210	120 to 210
12.	Seedling tray width, mm	250	250
13.	Seedling tray height, mm	20 to 25	20 to 25
14.	Planting speed, m/s	0.34 to 0.77	0.34 to 0.77
15.	Power transmission system	Synchromesh gear box with two forward speeds and one reverse speed	Synchromesh gear box with two forward speeds and one reverse speed

Evaluation of Self-propelled Rice Transplanters

The self-propelled transplanters were evaluated by UAS Raichur in black cotton soil for transplanting of rice seedlings. The seedlings age, mat width and mat thickness were 20-25 days, 250 mm and 20-25 mm, respectively. The height of seedlings used during trials ranged 100-250 mm. The observed effective field capacity of walk behind type unit was 0.19 ha/h which was about two times lower as compared to riding type unit (Table 2). Missing hills during transplanting trials ranged 0.2-0.5%.The cost of operation of walk behind and riding type units were Rs. 222 and 523 per hour, respectively. The number of tillerings per plant was the lowest (40-45) in traditional farmers practice and ranged 59-72 per plant for self-propelled transplanters. A net saving in labour and cost of transplanting (including nursery raising) were 72.22 and 48.03%, respectively for walk behind type self-propelled transplanter and 83.33% and 44.60%, respectively for riding type paddy transplanter as compared to traditional farmer's practice of rice transplanting.

Table 2 Performance results of self-propelled paddy transplanters

S. No.	Parameters	Farmer's practice	Paddy transplanters	
			Walk behind	Riding type
1.	Method of nursery raising	Conventional	Mat type nursery	Mat type nursery
2.	Seedling age, days	20-25	20-25	20-25
3.	Effective working width, mm	--	1200	1800
4.	Row to row spacing, mm	200-400	300	300
5.	Working depth, mm	30-50	50-65	50-65
6.	Planting speed, m/s	0.10	0.45	0.65
7.	Number of seedlings/hill	4-5	2-3	2-3
8.	Plant to plant spacing, mm	90-150	100-120	100-120
9.	Effective field capacity, ha/h	0.055	0.19	0.35
10.	Number of missing hills, %	0	0.2	0.5
11.	Floating hills, %	0	0. 2	0.2
12.	Field efficiency, %	--	68.95	71.23
13.	Labour requirement, man-h/ha (Transplanting)	18	5	3
14.	Fuel consumption, l/h	--	1.5	3.5
15.	Cost of operation, Rs./h	--	222	523
16.	Cost of operation, Rs./ha	6500	1168	1494
17.	Cost of operation for nursery raising, Rs./ha	3000	3769	3769
18.	Total cost of operation, Rs./ha	9500	4937	5263

Farmers Feedback

The mat type nursery growing was demonstrated to farmers and nursery raised for large scale demonstrations of these transplanters is shown in

Fig.2. The frontline demonstrations of self-propelled rice transplanters were conducted both by walk behind (Fig. 3) and riding type (Fig. 4) units which were appreciated by farmers. The transplanted field using self-propelled units is shown in Fig. 5. The self-propelled transplanters were cost effective in transplanting as compared to traditional practice by manual labour. There is a monetary benefit of Rs. 4563/ha and Rs. 4237/ha by using walk behind type transplanter and riding type paddy transplanter, respectively as compared to traditional method of paddy transplanting. The trainings on repair and maintenance and on use of transplantingunits helped the farmers in mechanizing transplanting operation.

Fig. 2. Mat type nursery raising at farmer's fields.

(a) Walk behind type **(b) Riding type**

Fig. 3.Frontline demonstrations of self-propelled rice transplanters.

Fig. 5. Demonstration trials of self-propelled rice transplanters.

Status of Technology

The walk behind/riding type transplanters were demonstrated for transplanting of paddy in black cotton soils at the selected farmer's fields in Raichur district of Karnataka. The walk behind unit was demonstrated in an area of 30 ha in Mandalagera, Halapur, Hirekotnikal and Chintamandoddi villages of Sindhanur taluka of Raichur district. Similarly, riding type self-propelled unit was demonstrated in an area of 36 ha in Haalapur, Hirekotnikal, Mandalagera, Chintamanadoddi, Dongarampura, Mallapura Camp, Javalgera and Basapur Camp villages of Sindhanur taluka of Raichur district. Nine farmer groups were functioning and each group purchased a paddy transplanter (riding/walk behind type). The nursery was raised on plastic trays at a central place in respective villages. In all, 204 ha area was covered under frontline demonstration. Apart from these farmers groups, 130 transplanters were purchased by farmers at different locations in Karnataka.The adoption of these machines led to enhancement of yield by 12-15%.

Manufacturers/Dealers of Self-propelled Rice Transplanters in Karnataka

1. VST Tillers and Tractors Ltd.
   P.B.No. 4801, Mahadevpura
   White Field Road, Bengaluru – 560048
   Tel: 080-28510805-07, 28510275, 23321285
   Mob: 9741376007, 9845052427
   E-mail: iyengar@vsttiller.com.com, chandramouli@vsttillers.com, sales@vsttillers.com

2. Krishi Farm Solutions
   Main Road, Sindhanur
   Raichur district

3. Varushapriya AgrotechPvt. Ltd.
   Agro Machinery Division
   195, 7th cross, 1st stage, Indiranagar
   Bengaluru - 560038
   Tel: 080-25250397
   Fax: 080-25252780
   E-mail: prithvibio98@hotmail.com, prthvi_prthvi@yahoo.co.in

4. Maruthi Trading Company
   Main Road, Sindhanur
   Raichur district

5. Greaves Cotton Ltd.
   No.16/3, Ali Asker Road
   Off CGM Road, Benglauru - 560052
   Tel: 080-22250986