

गुप्त परीक्षण रिपोर्ट

संख्या/ No.: MACHINE-38/2752/2021

CONFIDENTIAL TEST REPORT

माह/Month: September, 2021



**KUBOTA KNP – 6W, SELF PROPELLED,  
WALK BEHIND TYPE PADDY TRANSPLANTER**



भारत सरकार

**Government of India**

कृषि एवं किसान कल्याण मंत्रालय

**Ministry of Agriculture and Farmers Welfare**

कृषि, सहकारिता एवं किसान कल्याण विभाग

**Department of Agriculture, Cooperation and Farmers Welfare**

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

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## 10. TURNING ABILITY

Characteristics	LHS	RHS
Minimum turning diameter (m):	1.40	1.35
Minimum clearance diameter (m):	3.16	3.07

## 11. FIELD PERFORMANCE TEST

Field test was conducted for 36.94 hours. Field was puddled by using tractor operated rotavator followed by leveler. Total six test trials were conducted in sandy soil. Conditions of test plot and nursery & the field performance results are given Annexure-I & Annexure-II and summarized in table-1 & table-2

## Summary of condition of field and nursery

Table-1

Sl. No.	Parameters	Range
<b>Condition of field</b>		
1	Type of soil	Sandy
2	Interval between last puddling and planting, days	1 to 2
3	Depth of puddle, cm	15 to 25
4	Depth of standing water over puddle, cm	2 to 7

<b>Condition of nursery</b>		
1	Variety of paddy	PR-126
2	Type of seed bed soil	Sandy
3	Area of each tray/mat, m <sup>2</sup>	0.146 to 0.161
4	Age of nursery, days	20 to 26
5	Leaf stage (no. of leaves)	3 to 4
6	Length of root (cm)	2.5 to 8.0
7	Thickness of mat at root, mm	20 to 27

## Summary of performance results

Table-2

Sl. no.	Parameters	Range
1	Average forward speed, kmph	2.20 to 2.28
2	Engine speed, rpm	No. load 3432 to 3450
3	Average depth of transplanting, cm	5.6 to 6.4
4	Average travel reduction (%)	1.78 to 4.57
5	Average spacing between rows, cm	29.0 to 30.0
6	Average number of plants per hill (nos.)	2 to 7
7	Average spacing between hills, cm	17.8 to 18.1
8	Average total number of hills in 1 m <sup>2</sup>	22.7 to 24.0
9	Percentages of transplanting faults (in 1 m <sup>2</sup> ) %	
	- missed hills	0 to 2.00





	- Floating seedlings	0 to 1.00
	- Buried seedlings	0 to 0.33
	- Damaged seedlings	0 to 0.33
	- Total transplanting fault %	0.66 to 1.99
10	Average area Covered ha/h	0.255 to 0.298
	Time required to covered 1 ha (h)	3.35 to 3.92
11	Fuel consumption	
	- l/h	0.92 to 1.07
	- l/ha	3.35 to 3.81
12	Number of seedling trays consumed per ha	190 to 215

After loading the transplanter fully (full loading of the nursery on the seedling platform and carrier), the transplanting operation was done. Arrangements for loading the nursery mats was made at the ends of the plot. All the trials were conducted at the full accelerator setting of the engine as recommended by the applicant.

#### 11.1 Rate of work

The average area covered and time required to cover one hectare area recorded as 0.255 to 0.298 ha/h and 3.35 to 3.92 h respectively at the forward speed of 2.20 to 2.28 kmph.

#### 11.2 Quality of work

The quality of work was assessed by taking into consideration of the following parameters :-

- The average depth of transplanting was recorded as 5.6 to 6.4 cm.
- The spacing between row to row was recorded as 29.0 to 30.0 cm.
- The average number of plants per hill was recorded as 2 to 7.
- The average spacing between hills was recorded as 17.8 to 18.1 cm
- The average total number of hill in 1 m<sup>2</sup> was recorded as 22.7 to 24.0
- The average percentage of missing hills was recorded as 0 to 2.00 %
- The average percentage of floating seedlings was recorded as 0 to 1.00 %
- The average percentage of buried seedlings was recorded as 0 to 0.33 %
- The average percentage of damaged seedlings was recorded 0 to 0.33 %
- The total percentage of transplanting faults was recorded as 0.66 to 1.99 %

#### 11.3 Fuel consumption

The hourly fuel consumption was recorded as 0.92 to 1.07 l/h and fuel required for planting of one hectare area was recorded as 3.35 to 3.81 l/ha

#### 11.4 Labour requirement

One skilled operator's is required for continuous operation of machine. One person is required for feeding nursery mats to machine and two persons for handling the nursery trays.



**11.5 Ingress of water and/or mud**

After completion of field tests, the transplanter was partially dismantled to check the effectiveness of sealing provided against ingress of water and / or mud in various assemblies / components.

S. No.	Locations	Whether ingress of mud and / or water was observed
1	Engine oil	No
2	Main gear box	No
3	Planting box	No
4	Planting arm drive	No
5	Hydraulic system	No
6	Drive wheel chain case	No
7	Planting arms	No

**12. EASE OF OPERATION AND ADJUSTMENT**

No noticeable difficulty was observed in operation and adjustment during the field test.

**13. BREAKDOWNS AND REPAIRS**

No noticeable defect or breakdown was observed during test.

**14. COMPONENTS / ASSEMBLY INSPECTION**

The engine was dismantled after 56.64 hours (including 35 run-in) and the transplanter was dismantled after 39.94 hours of operation at this institute.

**14.1 Engine****I. Cylinder Bore**

Cylinder	Cylinder bore dia. (mm)						Max. permissible wear limit (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non Thrust side	Thrust side	Non Thrust side	Thrust side	Non Thrust side	
1	70.03	70.01	70.03	7.01	70.03	70.01	70.04

**II. Piston**

Piston no.	Piston dia. (mm)				Piston liner side clearance observed, mm	Max. permissible wear limit (mm)
	At top		At skirt			
	Thrust side	Non Thrust side	Thrust side	Non Thrust side		
1	69.76	69.69	69.97	Not measured due to piston design constraint	0.06	69.9



**14.3 Planter**

The gears of the main gear box, planting box and planting mechanism, seedling tray oscillating mechanism, chain cases and planting arms were dismantled and inspected visually. The observations are as under :-

**14.3.1 Main & planting gear box**

The transmission gears, bearings and shafts were visually inspected and no abnormal wear or damage of components was noticed. All components were found in satisfactory working condition.

**14.3.2 Planting arms**

All the four planting arms were dismantled and inspected visually. The arms, cams, bearings, springs and rod were found in normal working condition.

**14.3.3 Seedling platform**

The seedling platform were visually inspected and found in normal working condition.

**14.3.4 Chain case and wheels**

The chain cases of planting arms were visually inspected. The chains, sprockets and bearings were found in normal working condition.

**14.3.5 Floats**

All the three floats were examined visually for cracks, punctures, etc and found in satisfactory working condition. No mud or water entered inside the floats.

**14.3.6 Hydraulic system**

All components of hydraulic system was inspected visually and found to be in satisfactory working condition.

**15. CRITICAL TECHNICAL SPECIFICATION**

(Vide Ministry's communication no. 13-9/2019-M&T, (I&P) dated 26.04.2019 and F. No. 9-1/2019 M&T (I&P) dated 20.08.2019.

Sr. No.	Parameters	Specification	Observed	Remark
1.	Type of machine	Manually operated walk behind/ self propelled walk behind/ self-propelled ride on type	Self propelled walk behind	Conforms
2.	Working width, mm	880 (Min.)	1800 mm	Conforms
3.	Type of planting mechanism	Finger type for mat type nursery/ cup type for seeding cups	Finger type	Conforms
4.	Number of rows	4, 6, 8	06	Conforms
5.	Row spacing, mm	220 to 300	300	Conforms
6.	Average hill spacing, mm	120 to 250 (Adjustable)	120 to 210	Conforms
7.	Type and number of floats	Wooden plank/ metallic sheet/ PVC sheet/ hollow plastic	PVC	Conforms

8.	Angle of mat sliding board, degrees	45 to 70	60	Conforms
9.	Material of planting fork/ fingers/ tweezers	Stain steel type 4 and above	Stain steel	Conforms
10.	Provision for adjusting depth of planting	Must be provided	Provided	Conforms
11.	Provision for adjusting hill spacing	Must be provided	Provided	Conforms
12.	Provision for adjusting no of plants per hill	Must be provided	Provided	Conforms
13.	Marking/labeling	The labeling plate should be riveted on the body of machine having name & address of manufacturer, country of origin, make, model, year of manufacture, serial number, size, required size of prime mover kW/hp	Provided	Conforms
14.	Literature	Operator manual, service manual and parts catalogue should be provided	Provided	Conforms

## 16. SUMMARY OF OBSERVATIONS, COMMENTS AND RECOMMENDATIONS

### 16.1 Engine rating test

- The average rated power in rating test of engine was observed as 3.70 kW at 3100 rpm against manufacturers declared power as 4.1 kW at 3100 rpm.
- The specific fuel consumption at average rated power in rating test was observed as 350 g/kWh.

### Governing test

- Momentary speed change in percentage of rated speed was observed as 19.22 against recommended value within 15 percent for governing class 2 as per Clause 9.3.1 of IS: 7347-1974. It should be looked into.
- Permanent speed change in percentage of rated speed was observed as 18.54 against recommended value within 10 percent for governing class 2 as per Clause 9.3.1 of IS: 7347-1974. It should be looked into.

### 16.2 Noise Level

Noise level at operator's ear level was recorded as 86 dB(A), and noise level at bystander level was recorded 72 dB(A). which is well within the maximum and danger limit of 85 dB(A)/ 90 dB(A) respectively specified for continuous exposure of 8 hours.





**16.3 Mechanical Vibration**

The amplitude of mechanical vibration marked as (\*) on the relevant chapter are on drastically higher side. It is not just directly concerned with operator's health safety and comfort, but also adversely affect the useful life of the components. In view of above, this deserved to be given top priority for corrective action.

**16.4 Field Test**

The summary of field test is given chapter 12 of this report.

**16.5 Components / assembly inspection**

**16.5.1** The engine was dismantled after 90.19 hours of operation and wear of critical components were observed to be within the limits.

**16.5.2** The main gear box, planting box, planting arm drive mechanism and bearings were dismantled after 55.19 hours of operation and found in satisfactory working condition.

**16.6 Safety Provisions**

The machine has the following safety provisions.

- A front bumper.
- Front and rear bonnet above the engine and gear box.
- Drive belt protective covers.
- A slip clutch (torque limiter) inside the planting arm case to protect the planter drive mechanism.
- A jump clutch provided at the end of propeller shaft for planting case drive.

**16.7 Ease of operation and adjustments**

- All the controls, which are required to be used frequently are within the easy reach of the operator.
- The handling of machine was easy and stable and the operator can work continuously for about two hours.
- The planting depth, hill spacing and number of seedling per hill can be adjusted quickly.
- The seedling carrier is provided just above the engine for holding nursery trays. If the carrier is loaded fully with mat trays, operator's vision was obstructed.
- No other operational difficulty was noticed during the operation of the transplanter even in the smaller fields.
- One touch hydraulic swing system is provided to enable the operator to cross over the bunds and while turning the machine (even with full load) in the field.
- The machine is fitted with rubberized steel wheels and is stable in the field as well as on the road transportation.
- Two folding type markers are provided and can be operated by the operator while planter is in motion. One centre marker at bonnet is provided to guide the operator to drive planter in straight direction.
- The machine is provided with reverse field speed so that planting at corners / missing area can easily be done



**16.8 General Comments**



- Make & model of Hydraulic pump is not specified. It should be looked into.
- Valve spring stiffness is not specified. It should be looked into.
- Horn is not provided. It should be provided.

**17. TECHNICAL LITERATURE**

The following literatures are provided by the manufacturer.

- Operator's manuals
- Illustrated parts list
- Workshop manual

**TESTING AUTHORITY**

G.R. AMBALKAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 29.09.2021.

Test report compiled by C. Veeranjanyulu, Senior Technician

**18. APPLICANTS COMMENTS**

No specific comment is offered by the applicant.

