

गुप्त परीक्षण रिपोर्ट

संख्या/ No.: MACHINE-39/2753/2021

CONFIDENTIAL TEST REPORT

माह/Month: September, 2021



**KUBOTA KNP – 4W, 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

Northern Region Farm Machinery Training and Testing Institute

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[ISO 9001:2015 CERTIFIED]

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9. MECHANICAL VIBRATION MEASUREMENT

Date of test : 20.07.2021
Type of test surface : Plain Concrete Surface

| Sl. no. | Measuring points | | Vibration Micron | |
|---------|--------------------------------------------------|--------|------------------------------|----------------------------|
| | | | Horizontal displacement (HD) | Vertical displacement (VD) |
| 1 | Steering handle | Left | 281* | 291* |
| | | Right | 256* | 124* |
| 2 | Fuel tank cap | | 173* | 163* |
| 3 | Engine bonnet | Front | 166* | 145* |
| 4 | Head light | Left | 245* | 176* |
| | | Right | 263* | 290* |
| 5 | Gear shifting lever | | 329* | 295* |
| 6 | Main clutch lever | | 250* | 341* |
| 7 | Planting clutch lever at transport lock position | | 230* | 291* |
| 8 | Accelerator lever | | 270* | 146* |
| 9 | Planting depth adjusting lever | | 489* | 530* |
| 10 | Quantity of seedling adjusting lever | | 461* | 171* |
| 11 | Seedling platform | | 245* | 285* |
| 12 | Float | Left | 330* | 279* |
| | | Middle | 180* | 126* |
| | | Right | 364* | 360* |
| 13 | Engine mounting base | | 174* | 121* |

* Amplitude of mechanical vibration is on higher side.

10. TURNING ABILITY

| Characteristics | LHS | RHS |
|---------------------------------|------|------|
| Minimum turning diameter (m): | 1.40 | 1.39 |
| Minimum clearance diameter (m): | 2.92 | 2.73 |

11. FIELD PERFORMANCE TEST

Field test was conducted for 36.35 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 |
|---------|--------------------|-------|
| | Condition of field | |
| 1 | Type of soil | Sandy |



| | | |
|---|---------------------------------------------------|----------------|
| 2 | Interval between last puddling and planting, days | 1 to 2 |
| 3 | Depth of puddle, cm | 16 to 24 |
| 4 | Depth of standing water over puddle, cm | 2 to 6 |
| | Condition of nursery | |
| 1 | Variety of paddy | PR-126 |
| 2 | Type of seed bed soil | Sandy |
| 3 | Area of each tray/mat, m ² | 0.146 to 0.162 |
| 4 | Age of nursery, days | 24 to 27 |
| 5 | Leaf stage (no. of leaf) | 3 to 4 |
| 6 | Length of root (cm) | 4.0 to 8.0 |
| 7 | Thickness of mat at root, mm | 20 to 26 |

Summary of performance results**Table-2**

| Sl. no. | Parameters | Range |
|---------|---------------------------------------------------|----------------|
| 1 | Average forward speed, kmph | 2.25 to 2.38 |
| 2 | Engine speed, rpm | |
| | No. load | 3100 |
| 3 | Average depth of transplanting, cm | 5.75 to 6.50 |
| 4 | Average travel reduction (%) | 2.46 to 4.25 |
| 5 | Average spacing between rows, cm | 29.2 to 30.0 |
| 6 | Average number of plants per hill (nos.) | 2 to 7 |
| 7 | Average spacing between hills, cm | 17.8 to 18.0 |
| 8 | Average total number of hills in 1 m ² | 20.7 to 22.7 |
| 9 | Transplanting faults (in 1 m ²) | 20.7 to 22.7 |
| | - missed hills | 0 to 1.33 |
| | - Floating seedlings | 0 to 0.33 |
| | - Buried seedlings | 0 to 0.67 |
| | - Damaged seedlings | 0 to 0.33 |
| | - Total transplanting fault % | 0.66 to 1.66 |
| 10 | Average area Covered ha/h | 0.169 to 0.203 |
| | Time required to covered 1 ha (h) | 4.93 to 5.92 |
| 11 | Fuel consumption | |
| | - l/h | 0.78 to 0.87 |
| | - l/ha | 3.99 to 5.15 |
| 12 | Number of seedling trays consumed per ha | 176 to 223 |

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 0.169 to 0.203 ha/h and 4.93 to 5.92 h respectively at the forward speed of 2.25 to 2.38 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 5.75 to 6.50 cm
- The spacing between row to row was recorded as 29.2 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 18.0 cm
- The average total number of hill in 1 m² was recorded as 20.7 to 22.7
- The average missing hills in 1 m² was recorded as 0.00 to 1.33
- The average floating seedlings in 1 m² was recorded as 0 to 0.33
- The average buried seedlings in 1 m² was recorded as 0 to 0.67
- The average damaged seedlings in 1 m² was recorded 0 to 0.33
- The total transplanting faults in 1 m² was recorded as 0.66 to 1.66

11.3 Fuel consumption

The hourly fuel consumption was recorded as 0.78 to 0.87 l/h and fuel required for planting of one hectare area was recorded as 3.99 to 5.15 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.

15. CRITICAL TECHNICAL SPECIFICATION

(Vide Ministry communication No. 13-9/2019 M&T (I&P) dated 26.04.2019 and F. No. 9-12019 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.) | 1200 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 | 04 | 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 | 50° | 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 3.19 kW at 2600 rpm against manufacturers declared power as 3.3 kW at 2600 rpm.
- The specific fuel consumption at average rated power in rating test was observed as 343.3 g/kWh.

Governing test

- Momentary speed change in percentage of rated speed was observed as 18.46 against recommended value within 15 percent for governing class 2 as per clause 93.1.1 of IS: 7347-1974. It should be looked into.
- Permanent speed change in percentage of rated speed was observed as 17.69 against recommended value within 10 percent for governing class 2 as per clause 93.1.1 of IS: 7347-1974. It should be looked into

16.2 Noise Level

Noise level at operator's ear level was recorded as 82 dB(A), and noise level at bystander level was recorded 69 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 49.57 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 37.70 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.


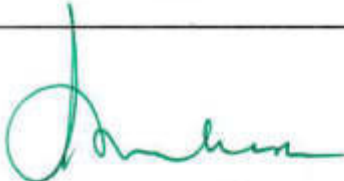


17. TECHNICAL LITERATURE

The following literatures are provided by the manufacturer.

- i. Operator's manuals
- ii. Illustrated parts list
- iii. 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.

