RICE TRANSPLANTER
‘KUBOTA NSD-8’
(SELF PRPELLED – RIDE ON)

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & COOPERATION)

NORTHERN REGION FARM MACHINERY TRAINING AND TESTING INSTITUTE
TRACTOR NAGAR, SIRSA ROAD, HISAR-125001 (HARYANA)
14.2.1 Main & planting gear box

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

14.2.2 Planting arms

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

14.2.3 Seedling holders & platform

The seedling holder, seedling platform and conveyor belt were visually inspected and found in normal working condition.

14.2.4 Floats

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

14.2.5 Hydraulic system

All components of the main and lateral feeding speed control hydraulic systems were inspected visually and found to be in normal working condition.

15. SUMMARY OF OBSERVATIONS, COMMENTS AND RECOMMENDATIONS

15.1 Engine Performance Test

<table>
<thead>
<tr>
<th>Brake power kW (Ps)</th>
<th>Crank shaft torque Nm (kgf-m)</th>
<th>Crank shaft speed (rpm)</th>
<th>Specific fuel consumption kg/kWh (kg/hph)</th>
<th>Specific energy kWh/l (hph/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum power two hours test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.9(20.3)</td>
<td>201.9(20.6)</td>
<td>2953</td>
<td>0.657(0.483)</td>
<td>1.261(1.714)</td>
</tr>
<tr>
<td>Power at rated engine speed (3000 rpm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.8(20.2)</td>
<td>197.0(20.1)</td>
<td>3010</td>
<td>0.653(0.480)</td>
<td>1.267(1.722)</td>
</tr>
<tr>
<td>Maximum torque</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.9(17.5)</td>
<td>225.4(23.0)</td>
<td>2280</td>
<td>0.765(0.562)</td>
<td>1.083(1.473)</td>
</tr>
</tbody>
</table>

- The maximum power of engine was recorded as 14.9 kW (20.3 Ps) at 2953 rpm against manufacturer's declaration of 15.4 kW (21.0 Ps).
- The specific fuel consumption corresponding to maximum power was recorded as 0.657 kg/kWh (0.483 kg/hph).
- The maximum torque of the engine was recorded as 225.4 (23.0) Nm (kgf-m).
• The back up torque of engine was recorded as 11.6% which is normal.
• The maximum lubricating oil temperature was recorded as 131.7 °C.

15.2 Noise Level

Noise level at by stander position/operator's ear level were recorded as 76.5/85.28 dB(A), which are well within the maximum/ danger limit of 85/90 dB(A) respectively, specified for continuous exposure of 8 hours.

15.3 Mechanical Vibration

The amplitude of mechanical vibration on some of the controls marked as (*) under chapter 9 of the report is on higher side.

15.4 Field Test

15.4.1 The transplanter was operated in varying field conditions for a total period of 46.0 hours for transplanting ‘PUSA-44, PUSA-1121 & PR-114’ variety of paddy seedlings. The results are summarized as under.

• The average depth of transplanting was recorded as 2.5 to 5.3 cm.
• The variation from mean of average depth of transplanting was recorded as 2.6 to 35.9 percent.
• The spacing between rows was recorded as 29.0 to 30.3 cm.
• The deviation in row spacing from the fixed setting of 300 mm was observed as -10 to +3 mm.
• The average number of plants per hill was recorded as 2 to 5
• The average spacing between hills was recorded as 15.0 to 19.0 cm.
• The % variation from mean of spacing between hills was recorded as 1.8 to 11.8
• The average total number of hill in 1 m² was recorded as 17.7 to 25.3
• The % variation from mean of total number of hill in 1 m² was recorded as 2.3 to 17.7
• The average number of missing hills was recorded in 1 m² as 0.3 to 2.7.
• The average number of floating seedlings was recorded in 1 m² as Nil to 0.70.
• The average number of buried seedlings was recorded in 1 m² as Nil
• The total transplanting faults was recorded in 1 m² as 0.33 to 2.7.
• The hourly fuel consumption was recorded as 1.57 to 2.21 l/h and fuel required for planting of one hectare area was recorded as 3.16 to 5.32 ha/h.
• Average area covered was recorded as 0.39 to 0.70 ha/h.
• Time required to cover one hectare 1.43 to 2.55 h/ha.
15.4.2 During the entire field operation, no overloading of the engine was noticed.
15.4.3 The quality of puddling, uniformity in leveling of the field. Standing water depth over puddle, uniformity of the nursery mats and presence of weeds remains in the puddle soil affect the performance of the planter to a great extent.

Therefore, to obtain best results from the machine, it is necessary to have the field well puddled and settled (for 2-3 days) field with 2-4 cm depth of standing water.

15.4.4 The number of missing hills per square meter area is attributed mainly attributed to the non uniform germination of nursery mat.

15.4.5 The quality of work was observed to be smooth during entire transplanting operation and overall performance of the machine was found satisfactory.

15.5 Components / assembly inspection
15.5.1 The engine was dismantled after 65.55 hours of operation and wear of critical components were observed to be within the limits.

15.6 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) at planting arm is provided to protect the planter drive mechanism.

15.7 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 is 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.
- Four wheel drive is provided for field work.
- Integral power steering is provided for easy working of operator.
15.8 Labour requirement
A trained operator is required for efficient operation of the machine. One helper is required for safe handling and loading of mats.

15.9 Literature

The manufacturer had provided operator's manual & parts catalogue with the machine in English language. The literature provided is found to be adequate for guidance of the users and services personnel. However, it is recommended to develop this literature in other Indian regional language to meet the regional requirement.

TESTING AUTHORITY

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APPLICANTS COMMENTS

No comments received