**COMMERCIAL TEST REPORT**

**REPORT NO.: IMP: 2011/350**
**MONTH: FEBRUARY 2022**


सत्यमेव जयते

# PADDY STRAW CHOPPER
# (GSA-PSC-751)

## TESTED AT

**STATE LEVEL FARM MACHINERY TRAINING AND TESTING INSTITUTE, RAHMANKHERA, HARDOI ROAD**
**LUCKNOW, U.P. - 227107**

Telephone: 0522- 2841021 E-mail: fmtcsima@gmail.com

(The Institute is approved Testing Centre by Department of Agriculture & Cooperation, Ministry of Agriculture, GOI vide letter no. 8-1/2004-My (I&P) dated September 14,2010 and subsequent letters)

**THIS TEST REPORT VALID FROM 11.02.2022 TO 10.02.2029**

| TEST REPORT NO. | NAME OF THE MACHINE/IMPLEMENT, MODEL NO. | MONTH | YEAR |
|---|---|---|---|
| IMP:2011/350 | PADDY STRAW CHOPPER (GSA-PSC-751) | FEBRUARY | 2022 |

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| | | |
|---|---|---|
| Type of test | : | COMMERCIAL |
| Name of machine | : | PADDY STRAW CHOPPER<br>(GSA-PSC-751) |
| Test Code referred | : | IS: 12362- (Part-1) Dec.2007 Mechanical Connections between towed and towing vehicles.<br>IS: 6025-Dec. 2004 Specification for knife sections for harvesting machines (first revision).<br>IS: 8132-1983 Test code for developing literature etc. |
| Test requested by | : | M/S- GSA INDUSTRIES<br>VILL- DAULATPUR, RASULPUR, JAURAN ROAD<br>DISTT-PATIALA, PUNJAB-147001 |
| Testing Authority | : | STATE LEVEL FARM MACHINERY TRAINING AND TESTING INSTITUTE, RAHMANKHERA, HARDOI ROAD LUCKNOW, U.P. – 226101 |
| Period of test | : | AUGUST 2021 TO FEBRUARY 2022 |



## Selected Conversions

| S. No | Units | Conversion Factor |
|---|---|---|
| **1** | **Force** | |
| | 1 kgf | 9.80665 N |
| | | 2.20462 lbf |
| **2** | **Power** | |
| | 1 hp | 1.01387 metric hp (Ps) |
| | | 745.7 W |
| | 1 Ps | 735W |
| | 1 kW | 1.35962 Ps |
| **3** | **Pressure** | |
| | 1 psi | 6.895 kPa |
| | 1 kgf/cm$^2$ | 98.067 kPa = 735.56 mm of Hg |
| | 1 bar | 100 kPa = 10 N/cm$^2$ |
| | 1 mm of Hg | 1.3332 m-bar |

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## 1. SCOPE OF TEST

The scope of test was to check and assess the following:

1.1 Specification and other data furnished by the applicant.

1.2 Field performance and suitability of machine for harvesting and making straw of Paddy stubbles left by grain combine with regard to:

i) Quality of work;
ii) Rate of work;
iii) Fuel consumption
iv) Ease of operation
v) Labour requirement
vi) Wear of critical components

## 2. MEHOD OF SELECTION

The machine was Randomly selected by representative of the testing authority out of 05 machines made available for selection from their periodical production line at manufacturer's site. machines of Sr.no.PSC0001 to Sr.no PSC0005 were available and sr.no. PSC0004 was selected for testing.

## 3. TEST CODE & PROCEDURE

Following test codes were referred for testing of Straw Chopper.

1. IS: 12362- (Part-1) Dec.2007 Mechanical Connections between towed and towing vehicles.
2. IS: 6025-Dec. 2004 Specification for knife sections for harvesting machines (first revision).
3. IS: 8132-1983 Test code for developing literature etc.

## 4. BRIEF DESCRIPTION OF MACHINE

Straw thrown and left by the grain combine harvester, collected and cut by reel & cutter bar and delivered to the cylinder concave (chaffer drum) section through a feeding auger and guide drum. In cylinder concave section, which is like a traditional thresher, the stubble is bruised and cut into pieces, to form the straw.

### 4.1 SPECIFICATION

**General:**

| | | |
|---|---|---|
| Name & address of manufacturer | : | M/S- GSA INDUSTRIES<br>VILL- DAULATPUR, RASULPUR, JAURAN<br>ROAD DISTT-PATIALA, PUNJAB-147001 |
| Make | : | GSA INDUSTRIES. |
| Model | : | GSA-PSC-751 |
| Serial number | : | PSC004 |
| Brand Name | : | AGRIZONE |
| Type | : | Tractor PTO Operated. |
| Year of manufacture | : | 2021-22 |
| Recommended power of tractor, hp (apa) | : | 45 & above |

**4.2 Brief specifications of prime mover used:**

| | | |
|---|---|---|
| Type | : | Four wheel agricultural tractor |
| Make and model | : | John Deere 5210 |
| Year & Model | : | 2019 |
| Chassis No. | : | WWCF61618943564 |
| Max. pto power, Kw (hp) | : | 34.3 |
| Rated Engine speed for field operation recommended by applicant, rpm | : | 1800 |

**4.3 Straw chopper**

**4.4 Toe Hook** : Refer fig. 1

**Transport wheels**

| | | |
|---|---|---|
| Type | : | Pneumatic Ribbed Wheel |
| No. and size | : | Two, 7.00-19, 10PR |
| Track width, mm | : | 2040 |
| Recommended tyre pressure, $kg/cm^2$ | : | 2.8 |

**4.5 Drive shaft**

| | | |
|---|---|---|
| Type | : | Telescopic shaft with universal Joints |
| No. of pieces | : | Two, Rectangular |
| No. of splines | : | 06, Splines at PTO and Gear box end |
| Size and length of shaft, mm | | 1330×52×52 Ø Dia. |
| Length (adjustable), mm | | |
| Minimum | : | 985 |
| Maximum | : | 1330 |
| Length and size of hollow Rectangular shaft | : | 740×50×50 mm ø |
| Length and size of inserted Rectangular shaft mm | : | 665×35×35 mm ø |

**4.6 Gear box:**

| | | |
|---|---|---|
| Type | : | Bevel gear |
| No. of teeth on gears | | |
| - Drive | : | 20 |
| -Driven | : | 15 |
| Length of splines, mm | : | 95 mm |
| Number of splines | : | 11 |
| Gear ratio | : | 1:32 |
| Oil capacity, l | : | 2.5, (SAE-140) |

| | | |
|---|---|---|
| Method of driving arrangement and location. | : | PTO drive with the help of universal coupling and located just above the feeding auger. |
| No. and type of bearings | : | 4 Total<br>32208, (**02 Pcs**), 32211 (**1Pcs**), 32210 (**1 pcs)** |

**4.7 Reel Assembly:**

| | | |
|---|---|---|
| Type | : | Tyne bar pick up reel |
| No. of tyne bars | : | 5 |
| Dia of bars, mm | : | 28 |
| Type of tyne bars | : | Hollow M.S. pipe with holes for fitting tine with the help of nut & bolts |
| Dia. of reel, mm | : | 460 |
| Width of reel, mm | : | 2090 |
| Speed corresponding to Engine speed of 1800 rpm | : | 72 |
| No. of tines on each bar and their spacing, mm | : | 13 Tyne 160 |
| Max. distance ahead of cutter bar, mm | : | 280 |
| Max. distance behind the cutter bar, mm | : | 270 |
| Max. vertical distance above the cutter bar point from the center of the reel, mm | : | 421 |
| Max. vertical distance below the cutter bar points mm | : | 21.8 |
| Distance from cutter bar points to the front of feeding auger, mm | : | 272 |
| Arrangement for raising and lowering of reel assembly | : | Manual by sliding the position of bearing housing block on its mount plate mechanically. |
| Arrangement for variation of angle of the tines. | : | By varying the distance between the roller pulleys which support the ring to which the bars are bolted through a eccentric ring. |
| Arrangement for forward & backward movement of the reel. | : | A minor arrangement is there through mounting bearing blocks of reel shaft which can be used to adjust the height on a slanted mounting frame. |
| Type of reel drive | : | V belt & pulley. |

No. and type of bearing : 2 UCP 207, and 2 Nylon brush.

**4.8 Cutter bar assembly**

Cutting width, mm : 2375

Effective cutter bar width, mm : 2250

No. of strokes corresponding to1800 rpm of engine : 82

Knife stroke, mm : 80.0

No. and spacing of knife guards : N.A

No and type of blades : 30, serrated

Type of ledger plates : Not provided

Details of the knife drive : Rotational power is converted to oscillation motion through a bell crank unit to which a pitman arm is connected and cutter bar assembly to its other end.

Arrangement for lifting of lodged crop. : By lowering the header.

**4.9 Feeding auger:**

Type : Screw auger on both ends with scoops

Size of auger, mm

Dia. : 470

Width : 2207

Speed of feeding auger corresponding to 540 PTO, rpm of tractor, rpm : 170

Safety device if any : Provided

**4.10 Details of scoop:**

No. of scoops : 14

No. of scoops on each row : 4 Each in Two Row and 3 each in alternate row.

Arrangement for adjusting the clearance of feeding auger : Slot provided in the auger shaft mounting on the both side.

Type of drive : Chain and sprocket.

No. and type of bearing safety Device : 2 ball bearing (UCF 207)

**4.11 Beater**

Type : Rectangular star type.

Size, mm

Length : 1385

width : 250

No. of sections : 4

| | | |
|---|---|---|
| Width of one section, mm | : | 250 |
| speed corresponding to engine Speed of 1800, rpm Location. | : | 900 |
| | : | Parallel to the axis of chaffer cylinder at front side and behind of cutter bar auger. |
| Type of drive | : | V- belt & pulley |
| No. and type of bearings. | : | Two sealed bearing (UCF-210) |
| safety | : | Safety cover provided |

**4.12 Front chopper drum**

| | | |
|---|---|---|
| Type | : | Reversible serrated blades |
| Size, mm | | |
| Width | : | 1380 |
| Dia. | : | 650 mm (With Blade 750 mm) |
| Speed of chopper drum corresponding to 540 PTO rpm of tractor, rpm | : | 900 |
| Peripheral speed, m/s | : | 34.8 |
| No. of bar | : | 16 |
| No. of blades and their spacing on each bar | : | 16 & 75 mm spacing |
| No. of hub plate | | 05 |
| Shape of blade | : | Serrated |
| Size of blade, mm | | |
| Height | : | 80 mm |
| Base | : | 75 mm |
| Top width | : | 40 mm |
| Type of drive | : | V-belt & pulley |
| No. & type of bearings | : | Two, bearings (UCF-211) |

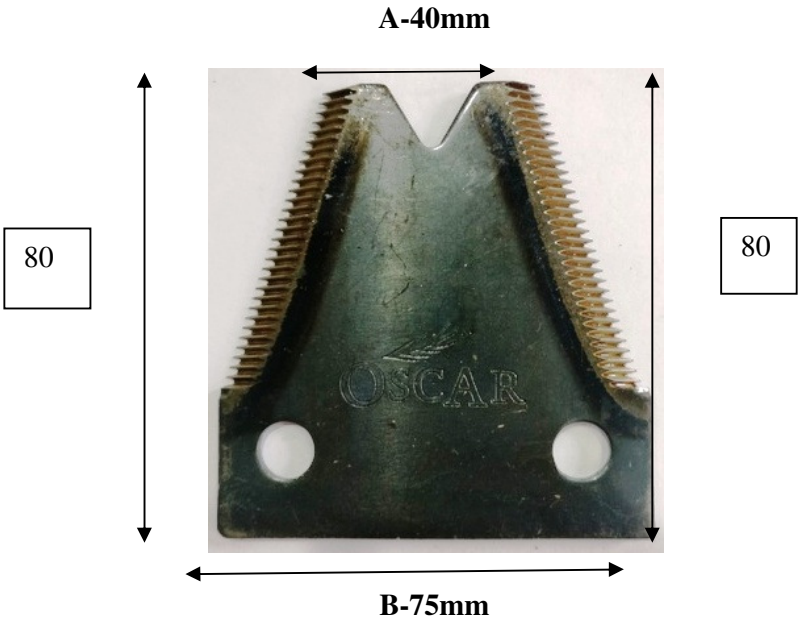


**Fig 1. CHOPPER DRUM (THRESHER) BLADE OF (GSA PADDY STRAW CHOPPER)**

| | |
|---|---|
| A-Top of the Blade | 40 mm |
| B- Base of Blade | 75 mm |
| C Side length of Blade | 80 mm |
| D Side length of Blade | 80 mm |

**TABLE NO:1 TOE HOOK OF (GSA PADDY STREW CHOPPER)**

| | |
|---|---|
| A | 226 |
| B | 212 |
| C | 45 |
| D | 75.2 |
| E | 24.3 |
| F | 12.0 |
| G | 40.0 |
| H | 148 |
| K | 75 |
| L | 80 |
| M | 52 |
| N | 15 |
| O | 145 |
| P | 86 |
| Q | 80 |
| R | 65 |
| S | 22 |

**4.13 Front fixed chopper assembly (Concave)**

| | | | |
|---|---|---|---|
| Overall width of concave, mm | | : | 1410 |
| Effective width of concave, mm | | : | 1400 |
| Peripheral length, mm | | : | 191 |
| Effective area, m2 | | : | 0.265 |
| Type of concave | | : | Close concave, reversible, serrated blades welded to supporting flat bar. |
| Blade size, mm | | : | |
| | Height | : | 80 |
| | Base | : | 75 |
| | Top width | : | 40 |
| Spacing of the half serrated blade | | : | 74 mm |
| Method of fixing of concave in place | | : | Directly fitted to main frame with nut and bolt. |
| No. of reversible blade per bar | | : | 35 in alternate 2 rows at spacing Of 78 mm (centre to centre) distance, Which are bolted to another side flat. |
| Method of adjusting the clearance between drum and concave | | : | 30 mm fixed clearance of between Drum and concave. |

**4.14 Details of extension : Not provided**

**4.15 Rear chopper drum (Upper)**

| | | | |
|---|---|---|---|
| Type | | : | Reversible serrated blades |
| Width, mm | | : | 1384 |
| Outer side dia. Mm | | : | 362 (with Blade 468 mm) |
| Speed of ear chopper drum corresponding to 540 PTO rpm of tractor, rpm | | : | 1080 |
| Peripheral speed (m/s) | | : | 26.40 |
| No. of blade and there spacing on each bar | | : | 18 on 3 bars and 17 on 3 bars spacing, 78 mm on each bar |
| No. of hub plate | | : | 6 |
| Shape of blade | | : | Trapezoidal with lip at centre to top and both side serrated. |
| Size of blade, mm | | | |
| | Height | : | 80 |
| | Base | : | 75 |
| | Top width | : | 40 |
| Type of drive | | : | V-belt pulley |
| No. and type of bearings | | : | Two sealed ball bearing (UCF-209) |

**4.16 Rear chopper drum (Lower)**

| | | |
|---|---|---|
| Type | : | Reversible serrated blades |
| Width, mm | : | 1385 |
| Outer side dia. Mm | : | 363 (with Blade 468 mm) |
| Speed of ear chopper drum corresponding to 540 PTO rpm of tractor, rpm | : | 981 |
| Peripheral speed (m/s) | : | 25 |
| No. of blade and there spacing on each bar | : | 18 on 3 bars and 17 on 3 bars spacing, 78 mm on each bar |
| No. of hub plate | : | 6 |
| Shape of blade | : | Trapezoidal with lip at centre to top and both side serrated. |
| Size of blade, mm | | |
| Height | : | 80 |
| Base | : | 75 |
| Top width | : | 40 |
| Type of drive | : | V-belt pulley |
| No. and type of bearings | : | Two sealed ball bearing(UCF-209) |

**4.17** Rear fixed chopper assembly (concave) : Provided
**4.18** Chopper reflector plate : Provided
**4.19** Straw blower : Not provided
**4.20** Beam : Provided

**4.21 Safety device provided on the machine**

One spring loaded shutter of M.S. sheet provided behind the header assembly to remove stones etc. which may enter along with the straw.

**4.1.1 Drive and size of belts**

| Sr. no. | Assembly | Type of Driven | Size of belt | No. of Belt | Method of Adjusting bet Tension |
|---|---|---|---|---|---|
| **01** | Real | Cutter bar auger pulley to real pulley | C-68 | 01 | Provided |
| **02** | Front Chaffer Drum | Main Pulley to Chaffer Drum Pulley | C-83 | 03 | Provided |
| **03.** | Cutter Bar | Front Chaffer Drum pulley to cutter bar Drive | C-76 | 01 | Provided |
| **04** | Beater | Chaffer Drum Pulley to beater pulley | C-80 | 01 | Provided |
| **05** | Blower | Blower Pulley to Blower Pulley | N/A | N/A | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **06** | Rear Chaffer Drum | Front Chaffer Drum pulley to Rear Chaffer Drum pulley | Upper C- 74 Lower C-75 | 02 | Provided |

**5. Total number of lubricating points.**

| | | |
|---|---|---|
| Greasing | : | 22 |
| Oiling | : | 18 |
| Grease cups | : | 20 |

**5.1 Overall dimensions**

Standing position, mm

| | | |
|---|---|---|
| - Length | : | 3770 |
| - Width | : | 2580 |
| - Height | : | 1420 |
| Overall length of machine with tractor, mm | : | 7380 |
| Machine stand | : | Provided |
| Tool box | : | Provided |
| Mass of Paddy straw chopper , kg | : | 1900 APA |

| | | | |
|---|---|---|---|
| **5.2** | **Colour of straw chopper** | **:** | Red and white |
| | Reel assembly, tool | : | Gray |
| | Header, chassis & lower sheet Material, Beater | : | Red |
| | Towing hook, wheel rim & upper sheet metal | : | white |

**5.3 Turning circle diameter & turning space (with tractor)**

| | | | |
|---|---|---|---|
| **5.4.1** | Minimum diameter of turning circle (m) | | |
| | LHS | : | 6.62 |
| | RHS | : | 6.85 |
| **5.4.2** | Minimum diameter of turning space (m) | | |
| | LHS | : | 6.80 |
| | RHS | : | 6.90 |

**6. RUNNING-IN**

Paddy Straw chopper was run-in for 25.0 h at the testing institute as per applicant's recommendation.

## 7. FUEL AND LUBRICANTS

### 7.1 Fuel:

The high speed diesel by M/s Indian oil corporation Ltd was used throughout the tests.

### 7.2 Lubricants used for paddy straw chopper

| Particulars | As specified by applicant | As used during the test |
|---|---|---|
| Gear box oil | EP-140 | EP-140 |
| Grease | Servo Grease M.P | Servo Grease M.P |

### 7.3 Maintenance schedule of paddy straw chopper

Maintenance schedule was not provided by the applicant. However, following points were greased/oiled periodically in consultation with the applicant's representatives during test.

| A-1 | Greasing points: (Once in weak during season) | Number |
|---|---|---|
| 1. | PTO shaft bearing | 4 |
| 2. | Universal Joint cross of PTO shaft & main shaft | 2 |
| 3. | Main shaft bearing | 1 |
| 4. | Crank bearing | 4 |
| 5. | Crank ball | - |
| 6. | Cutter auger shaft bearing | 2 |
| 7. | Cutter bar drive shaft bearing | 2 |
| 8. | Beater shaft bearing | 2 |
| 9. | Chaffer cylinder shaft bearing<br>Front<br>Upper Rear<br>Lower Rear | <br>2<br>2<br>2 |
| 10. | Blower shaft bearing | 2 |
| 11. | Reel shaft bearing | 2 |
| **A-2** | **Idler pulley bearings** | |
| 1. | Idler pulley bearing of cutter bar drive belt | 1 |
| 2. | Idler pulley bearing auger chain | 1 |

| | | |
|---|---|---|
| 3. | Idler pulley bush of reel belt. | 1 |
| 4. | Idler pulley bearing of beater belt | 1 |
| 5. | Idler pulley bearing of rear cylinder drum (upper) | 1 |
| 6. | Idler pulley bearing of rear cylinder drum (lower) | 1 |
| **A-3** | **Grease cups** | |
| 1. | Grease cup of wheel bearings | 20 |
| **B.** | **Oiling points:** | |
| 1. | Reel moving bushes | 20 |
| 2. | Cutter bar | 6 |
| | **Total** | **77** |

## 8. LABORATORY TESTS:

Material Analysis: The hardness and chemical analysis with respect to critical component are given in table 3 & 4 respectively.

### A. Hardness

**Table- 3: Hardness of critical parts:**

| SR. No. | Component | Material | Hardness observed (HRC) |
|---|---|---|---|
| **1.** | Cutter bar blade | High carbon steel | 58.2,59.1,60 |
| **2.** | Cylinder blade | High carbon steel | 61.3,57.6,62.1 |

### B. Chemical analysis of primary element

**Table- 4: Chemical analysis of critical component**

| SR. No. | Component | Primary element | | | | |
|---|---|---|---|---|---|---|
| | | **Carbon** | **Manganese** | **Silicon** | **Phosphorous** | **Sulphur** |
| **1.** | Cutter bar blade | 0.78 | 0.64 | 0.19 | 0.010 | 0.003 |
| **2.** | Cylinder blade | 0.78 | 0.65 | 0.20 | 0.010 | 0.003 |

## 9. FIELD TEST

The Paddy straw chopper operated with John Deere 5210 at engine throttle setting corresponding to 540 PTO rpm was tested in the field for 25.0 hour for reaping and shredding of left over straw and stubbles after paddy harvesting by gain combine harvester. During test field performance of paddy straw chopper was assessed with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. Performance parameters as observed during field test are also given in Annexure-I&II and summarized in Table-V and VI The detail of the tractor used for field operation are given in Annexure-III

**Table-5 Summary of field crop conditions**

| S. No. | Parameters | Range of parameters |
|---|---|---|
| 1. | Paddy stubble population, No./m2 | 168-208 |
| 2. | Moisture content of straw,% | 20.0-23.6 |
| 3. | Height of stubbles before harvesting, cm | 18.2-29.5 |
| 4. | Height of stubbles after harvesting, cm | 3.7-5.0 |

**Table-6 Summary of field performance test**

| SR. No. | Observations | Range of observation |
|---|---|---|
| 1. | Speed of operation, kmph | 3.84 to 3.99 |
| 2. | Width of cut, m | 2.08 to 2.11 |
| 3. | Rate of work, ha/h | 0.44 to 0.50 |
| 4. | Fuel consumption<br>l/h<br>l/ha | <br>4.000 to 4.210<br>8.320 to 9.080 |
| 5. | Power consumption, kw | 36.5 |
| 6. | Average length, of straw, mm | 8.06 to 9.66 |
| 7. | Field efficiency, % | 53.65 to 62.02 |

**9.1 Quality of work:**

Average length of straw ranged from. 8.06 to 9.66 mm. The field efficiency varied from 53.65 to 62.02 present in paddy straw chopper.

**9.2 Rate of work:**

Rate of work of paddy straw chopper consists of two main points: (a) Area covered per unit time and (b) straw recovery. Area covered ranged from 0.44 to 0.50 ha/h. fuel consumption of tractor to operate the straw chopper combine combination (chopper and tractor) ranged from 4.000 to 4.210 l/h. Power required to operate straw paddy chopper is 36.5 Kw.

**10. Ease of handling during operation**

No specific problem was observed in handling during operation of paddy straw chopper.

**10.1. Labour Requirements**

No breakdown was observed during 25.0 hrs. of operation of field test.

**11.** Safety features

i) No safety clutch is provided for blade, drum & tractor PTO shaft.
ii) Belt and Pullies are covered by a M.S. sheet.
iii) Operator & Service Manual is Provided
iv) Parts Catalogue is provided

**12. WEAR OF CRITICAL COMPONENTS**

The wear of serrated blades of cutters, bar cylinder, and concave (front & rear) was Measured after completion of 25.0 hours of paddy straw chopper.

Percentage wear on mass basis were computed and results are given below in Table.

**Chopper cylinder Front**

| Sr.no. | Initial mass(g) | Final mass after 25.0 hrs. (g) | Wear (g) | Wear(%) |
|---|---|---|---|---|
| 1 | 68.0 | 67.0 | 1.0 | 1.47 |
| 2 | 70.0 | 69.4 | 0.60 | 0.85 |
| 3 | 67.0 | 66.2 | 0.80 | 1.19 |
| 4 | 69.0 | 68.1 | 0.90 | 1.30 |
| 5 | 70.0 | 68.0 | 2.0 | 2.85 |
| 6 | 68.0 | 67.0 | 1.0 | 1.47 |
| 7 | 70.0 | 68.0 | 2.0 | 1.47 |
| 8 | 68.0 | 67.2 | 0.80 | 1.17 |
| 9 | 69.0 | 68.1 | 0.90 | 1.30 |
| 10 | 68.0 | 67.1 | 0.90 | 1.32 |
| 11 | 67.0 | 66.0 | 1.0 | 1.49 |
| **Chopper concave knife blade** | | **Final mass after 25.0hrs. (g)** | **Wear (g)** | **Wear(%)** |
| 1. | 69.0 | 68.2 | 0.80 | 1.15 |
| 2. | 70.0 | 69.1 | 0.90 | 1.28 |
| 3. | 68.0 | 67.0 | 1.0 | 1.47 |
| 4. | 69.0 | 67.0 | 1.0 | 2.89 |
| 5. | 70.0 | 69.0 | 1.0 | 1.42 |
| 6. | 72.0 | 71.1 | 0.90 | 1.25 |

**(A) Chopper cylinder Rear (Upper)**

| Sr.No. | Initial mass(g) | Final mass after 25.0 hrs.(g) | Wear (g) | Wear(%) |
|---|---|---|---|---|
| 1. | 68.0 | 67.4 | 0.60 | 0.88 |
| 2. | 70.0 | 69.2 | 0.80 | 1.14 |
| 3. | 72.0 | 71.1 | 0.90 | 1.25 |
| 4. | 68.0 | 67.0 | 1.0 | 1.47 |
| 5. | 70.0 | 68.0 | 2.0 | 2.85 |
| 6. | 69.0 | 68.0 | 1.0 | 1.44 |
| 7. | 68.0 | 67.2 | 0.80 | 1.17 |

| | | | | |
|---|---|---|---|---|
| 8. | 69.0 | 68.1 | 0.90 | 1.30 |
| 9. | 68.0 | 66.0 | 2.0 | 2.94 |

**(B) Chopper cylinder Rear (Lower)**

| Sr.no. | Initial mass(g) | Final mass after 25.0 hrs.(g) | Wear (g) | Wear(%) |
|---|---|---|---|---|
| 1 | 70.0 | 69.4 | 0.60 | 0.85 |
| 2 | 68.0 | 67.2 | 0.80 | 1.17 |
| 3 | 70.0 | 69.3 | 0.70 | 1.0 |
| 4 | 69.0 | 68.1 | 0.90 | 1.30 |
| 5 | 65.0 | 64.0 | 1.0 | 1.53 |
| 6 | 68.0 | 67.0 | 1.0 | 1.47 |
| 7 | 70.0 | 68.0 | 2.0 | 2.85 |
| 8 | 69.0 | 66.0 | 3.0 | 4.34 |

## 13. SUMMARY OF OBSERVATIONS

### 13.1 Rate of work and fuel consumption

On the basis of field tests, output of the machine varied from 0.44 to 0.50 ha/h. The forward speed of tractor 3.84 to 3.99 kmph.inL-2 gear. Fuel consumption of tractor varied from 8.320 to 9.080 l/ha.

### 13.1.2 Quality of work

The average length of straw was observed as 0.06 to 9.66 mm. The field efficiency was from 53.65 to 62.02%.

### 13.1.3 Comments and recommendations

1. Quality of paddy straw was observed to be satisfactory and is considered to be satisfactory as field manure.
2. It is recommended to incorporate the safety device in drive shaft.
4. Hardness and chemical analysis of critical component are given in Table -3-4 Of this test report.
5. Machine serial/product No. is specified. Each machine should have the serial No. It may be provided during regular production level.
6. The drive safety devices are not provided. It may be provided with propeller shaft.
7. Arrangement should be made to permanently display the quality and parameters obtained in the test in all commercially manufactured (agriculture machines by putting engraved seals or plates) on the machines, so that the farmers can get proper information about the quality of the equipment

## 14. LITERATURE

Literature is provided with the machine by the manufacture. It is recommended to develop the operator manual, spare parts catalogue and service manual as per IS : 8132-1999 in English as well as in other regional languages and provided it with machine for guidance of users & service personnel.

## 15. APPICANTS COMMENTS

We will Supply the Good Quality products to Customer as per Indian Standard.

**TESTING AUTHORITY**

| | |
|---|---|
| (UPENDRA KUMAR)<br>-SENIOR TECHNICAL ASSISTANT- | |
| (ANAND CHAUDHARI)<br>-TEST ENGINEER- | |
| (DIGVIJAY SINGH)<br>-TEST ENGINEER- | |
| (JIWAN PRAKASH)<br>-ASSOCIATE PROFESSOR – ENGG. | |
| (DR. PANKAJ TRIPATHI)<br>- DIRECTOR- | 11/2022 |

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**ANNEXURE-I**

## OBSERVATION SHEET FOR FIELD TESTING (PADDY STRAW CHOPPER)

**Place of Test** : Vill- Karayra (Unnao) KVK
**Tractor used** **:** John Deere-5210
**Gear Used** **:** L-2
**Type of soil** **:** Sandy loam

| Test No. | Plant population, No. of tillers per $m^2$ | Av. Height of stubbles before reaping, (cm) | Av. Height of stubbles after reaping, (cm) | Av. Length of straw (cm) | Av. Weight of straw before reaping ($g/m^2$) | Av. Weight of straw after reaping ($g/m^2$) |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | 208 | 29.5 | 5.0 | 9.66 | 1076.6 | 77.6 |
| 2 | 187 | 25.0 | 4.5 | 8.66 | 915.6 | 24.5 |
| 3 | 187 | 20.7 | 3.7 | 8.06 | 1068.3 | 83.6 |
| 4. | 163 | 18.2 | 4.7 | 8.90 | 779.6 | 61.8 |

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**ANNEXURE-II**

## OBSERVATION SHEET FOR FIELD TESTING (PADDY STRAW CHOPPER)

**Place of Test** : Vill- Karayra (Unnao) KVK
**Tractor used** **:** John Deere-5210
**Gear Used** **:** L-2
**Type of soil** **:** Sandy loam

| Test No. | Date of test | paddy stubble Crop variety | Duration of test, h | speed of test (kmph) | Width of cut (m) | Rate of work | | Fuel consumption | | Moisture content of straw | Field Efficacy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (ha/h) | Time required for 1 hac. area covered (h) | (l/h) | (l/ha) | (%) | (%) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1 | 15-11-21 | SHIAT-4 | 6.0 | 3.91 | 2.11 | 0.44 | 2.27 | 4.000 | 9.080 | 2.0 | 53.65 |
| 2 | 16-11-21 | SHIAT-4 | 7.0 | 3.99 | 2.09 | 0.50 | 2.00 | 4.210 | 8.420 | 21.6 | 60.24 |
| 3 | 17-11-21 | SHIAT-4 | 6.0 | 3.84 | 2.08 | 0.49 | 2.04 | 4.150 | 8.466 | 23.6 | 62.02 |
| 4. | 18-11-21 | SHIAT-4 | 6.0 | 3.98 | 2.09 | 0.48 | 2.08 | 4.000 | 8.320 | 20.3 | 57.83 |

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**ANNEXURE: III**

## SYMBOL AND ABBREVIATION

### SYMBOLS

I- Symbols assigned to basis SI unit

| Sl. No. | Physical quantity | Name of SI unit | Symbol |
|---|---|---|---|
| 1 | Length | Meter | m |
| | | Millimeter | mm |
| 2 | Mass | Kilogram | kg |
| | | Gram | g |
| | | Tone | t |
| 3 | Time | Second | s |

II - Symbols assigned to some derived units

| Sl. No. | Physical quantity | Name of SI unit | Symbol |
|---|---|---|---|
| 1 | Area | Square centimeter | $cm^2$ |
| | | Square meter | $m^2$ |
| | | Hectare | ha |
| 2 | Speed/ Velocity | Meter per second | m/s |
| | | Kilometer per hour | kmph |
| 3 | Pressure | Newton per square millimeter | $N/mm^2$ |
| 4 | Time | Minute | min |
| | | Hour | hr |
| 5 | Volume | Cubic centimeter | $cm^3$ |
| | | Milliliter | ml |
| | | Liter | l |
| 6 | Maximum | Max | mm |
| 7 | Minimum | Min | mm |

### ABBREVIATIONS

| | | | | | |
|---|---|---|---|---|---|
| As per applicant | : | apa | Clause | : | Cl |
| Degree | : | deg | Figure | : | Fig |
| Indian Standard | : | IS | Kilowatt | : | kW |
| Number | : | No. | Not available | : | N.A. |
| Not Recorded | : | N.R. | Percent | : | % |
| Reference | : | Ref. | Revolution per minute | : | rpm |
| Diameter | : | Ø | | | |