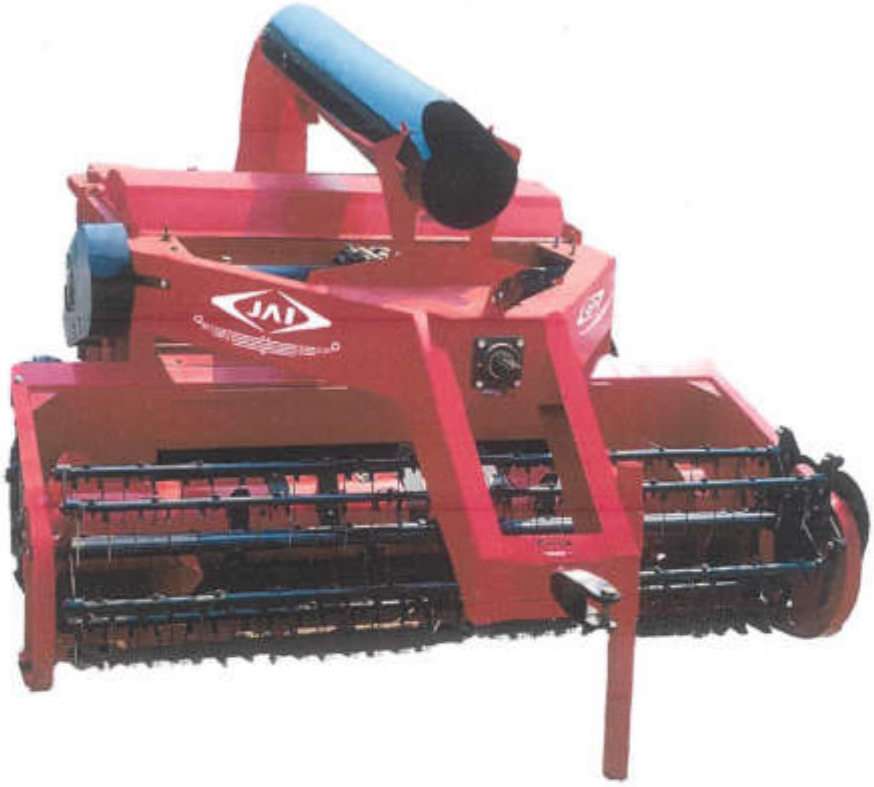
व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ **No.: SR. COMB-153/3076/2023**
माह/**Month: September, 2023**

THIS TEST REPORT VALID UP TO : 30th September, 2030



JAMNA, JAIHSR-3600, TRACTOR OPERATED STRAW REAPER COMBINE

भारत सरकार
Government of India
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Ministry of Agriculture and Farmers Welfare
कृषि एवं किसान कल्याण विभाग
Department of Agriculture and Farmers Welfare
उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
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x)	Stone trap mechanism	Provided
xi)	Height of cut	By adjusting hitch height
xii)	Any other adjustment	--

8. LABORATORY TESTS

Material analysis: The hardness and chemical analysis with respect to critical components are given in Table-3 & 4 respectively.

Table-3: Hardness of critical parts:-

Sr. No.	Component	Material	Hardness observed (HRC)	
			Hardened zone	Remainder zone
1	Cutter bar blade	High carbon steel	56.8	29.8
2	Knife guard	High carbon steel	223 (HB)	
3	Knife back	Mild carbon steel	183 (HB)	
4	Chopping cylinder blade	High carbon steel	57.4	28.5
5	Concave blade	High carbon steel	57.6	27.3

Table-4: Chemical analysis of critical components

Sr. No.	Component	Primary element(%) by weight				
		Carbon	Manganese	Silicon	Phosphorous	Sulphur
1	Knife blade	0.66	1.14	0.27	0.01	0.04
2	Knife guard	0.38	1.33	0.29	0.02	0.06
3	Knife back	0.12	0.74	0.15	0.02	0.04
4	Chopping cylinder blade	0.67	1.19	0.29	0.01	0.03
5	Concave blade	0.65	1.23	0.27	0.00	0.03

9. FIELD TEST

The straw reaper combine was operated with Swaraj 969 tractor at engine throttle setting corresponding to 540 PTO rpm was tested in the field for 38.32 (including running-in 1.50) hours for reaping of left over straw & stubbles after wheat harvesting by grain combine harvester. During tests, field performance of straw reaper was assessed with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The crop parameters, atmospheric conditions and performance parameters as observed during field tests are also given in **Annexure-I & II** and summarized in Table-5 & 6.

Table-5 : Summary of field crop conditions

Sr. No.	Parameters	Range of parameters
1.	No. of tillers, m^2	187 to 234
2.	Manually recovered straw, g/m^2 (Stubbles only)	325.6 to 408.2
3.	Moisture content of straw, %	6.80 to 9.00
4.	Loose straw, g/m^2	244.2 to 287.2
5.	Height of stubbles before harvesting, mm	245.0 to 288.0
6.	Height of stubbles after harvesting, mm	53.60 to 68.80

Table -6 : Summary of field performance test

Sr. no.	Observations	Range of observations
1.	Speed of operation, kmph	1.11 to 1.18
2.	Width of cut, m	2.20 to 2.22
3.	Overlap,%	0.89 to 1.79
4.	Rate of work, ha/h	0.196 to 0.218
5.	Fuel consumption l/h l/ha l/t	 5.07 to 5.58 25.15 to 26.90 8.33 to 10.12
6.	PTO power consumption, kW	12.74
7.	Average length of straw, mm	12.10 to 18.29
8.	Straw split,%	93.48 to 96.24
9.	Straw recovery,%	87.28 to 88.72
10.	Grain recovery,%	65.25 to 73.26

9.1 Ease of operation

No noticeable problem was observed during operation of straw reaper.

9.2 Quality of wheat straw: Satisfactory for animal feed.

9.3 Labor requirements

One man hour was required for daily maintenance of tractor and straw reaper. One skilled operator is needed to operate tractor with straw reaper.

10. WEAR OF CRITICAL COMPONENTS

The wear of serrated blades of chopping cylinder and concave was measured after completion of 38.43 hours of wheat straw harvesting.

Percentage wear on mass basis were computed and the results are given below in Table - 7

Table-7: Wear assessment of blades on mass basis

10.1 Concave blade

Sr. no.	Concave		
	Mass before test (g)	Mass after test (g)	Wear (%)
1	137.9	137.1	0.58
2	138.2	137.6	0.43
3	136.5	136.0	0.37
4	135.0	134.4	0.44
5	137.4	136.9	0.36
6	139.3	138.6	0.50
7	136.6	136.0	0.44
8	140.2	139.8	0.29
9	137.6	136.9	0.51
10	137.2	136.5	0.51
11	136.2	135.7	0.37
12	137.9	137.1	0.58

10.2 Chopping cylinder

Sr. No.	Chopping cylinder		
	Mass before test (g)	Mass after test (g)	Wear (%)
1	138.3	137.8	0.36
2	139.4	138.9	0.36
3	138.5	138.0	0.36
4	136.1	135.6	0.37
5	138.1	137.7	0.29
6	136.3	135.9	0.29
7	137.7	137.2	0.36
8	137.5	136.9	0.44
9	138.7	138.1	0.43
10	135.8	135.2	0.29
11	137.0	136.3	0.51
12	138.3	137.6	0.51
13	138.1	137.5	0.43
14	137.2	136.4	0.58
15	136.8	136.2	0.44
16	137.4	136.8	0.44

Wear of concave & chopping cylinder blade on mass basis has ranged from 0.29 to 0.58 % and 0.29 to 0.58 % respectively.

11. ADJUSTMENTS, DEFECTS, BREAKDOWN AND REPAIRS

No noticeable defect / breakdown was observed during the test

12. CRITICAL TECHNICAL SPECIFICATION

[Vide Ministry Letter No. 13-9/2019-M & T (I&P)-Part dated 26.04.2019 and F. No. 9-1/2019 M&T (I&P) dated 20.8.2019]

Sr. No.	Parameters	Specifications	Observed	Remarks
1	Towing hook type	Clevis/Circular	Clevis	Conforms
2	Power input connection to tractor PTO	Propeller shaft with universal joint	Provided	Conforms
3	Cutting width, mm	1500 to 2500	2240	Conforms
4	Speed of chopping cylinder, rpm	800 to 1000	839	Conforms
5	Chopping cylinder dia., mm	700 to 900	770	Conforms
6	PTO drive shaft -Safety against overload -Guard on shaft	Compliant with BIS Code Must be provided Must be provided	 Provided Provided	 Conforms Conforms

7	Safety cover on all drives	Must be provided	Provided	Conforms
8	Chopping cylinder blade	Serrated	Serrated	Conforms
9	Material of blade and ledger plate	High carbon steel EN 42J & EN 44	EN44	Conforms
10	Hardness of blade and ledger plate, HRC	36 and 45 (Min.)	56.8 and 57.4	Conforms
11	Provision for concave clearance adjustment	Must be provided	Provided	Conforms
12	Provision for grain recovery	Must be provided	Provided	Conforms
13	Reel type	Pick up tyne	Provided	Conforms
14	Diameter of tyne bar, mm	20 (Min.)	26.7	Conforms
15	Arrangement for forward and backward movement of reel	Must be provided	Provided	Conforms
16	Labeling of lubricating points	Must be provided	Provided	Conforms
17	Marking/labeling of machine	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
18	Literature	Operator manual, service manual & parts catalogue should be provided.	Provided	Conforms

13. COMMENTS & RECOMMENDATIONS

13.1 The construction of PIC and PIC shaft does not meet the requirement of IS: 4931-1995. It **MUST** be looked into for corrective action.

13.2 Visual observations and provision for adjustments

i) The provision for following adjustment on straw reaper is not provided. It should be provided. Adjustment of air displacement.

14. TECHNICAL LITERATURE

One booklet entitled "Service, Operating & Maintenance manual" was provided for reference during test. The same, however, needs to be updated as per IS-8132-1999.

TESTING AUTHORITY

Er. SANJAY KUMAR **AGRICULTURAL ENGINEER**	
Dr. MUKESH JAIN **DIRECTOR**	12.09.2023

15. APPLICANT'S COMMENTS

We will be provide all requisite in future production.