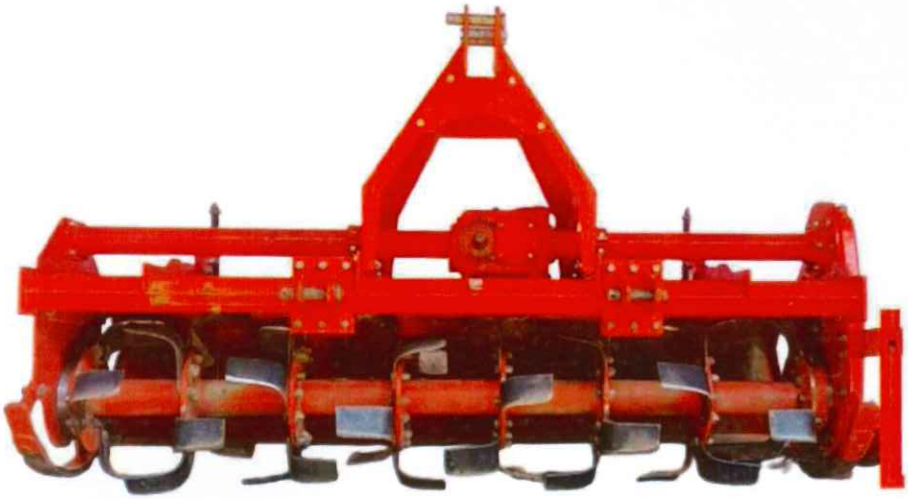
व्यावसायिक परीक्षण रिपोर्ट (प्रारंभिक)
COMMERCIAL TEST REPORT
(Initial)

संख्या/No.: LD/NERFMTTI, B. Chariali/
07/07/564
माह / Month: February 2026

THIS TEST REPORT IS VALID UPTO 28.02.2033



BHOOMI-DARSHAN, 2023, ROTAVATOR

सत्यमेव जयते

भारत सरकार
GOVERNMENT OF INDIA
कृषि एवं किसान कल्याण मंत्रालय
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
कृषि एवं किसान कल्याण विभाग
DEPARTMENT OF AGRICULTURE AND FARMERS WELFARE
उत्तर पूर्वी क्षेत्र कृषि यंत्र प्रशिक्षण एवं परीक्षण संस्थान
NORTH EASTERN REGION FARM MACHINERY TRAINING & TESTING INSTITUTE
बिश्वनाथ चारिआलि, जिला - बिश्वनाथ(असम)
BISWANATH CHARIALI, DIST- BISWANATH, ASSAM, PIN - 784 176
[AN ISO 9001:2015 CERTIFIED INSTITUTION]

Ph. No. 03715-222094 Website: https://nerfmtti.nic.in E-mail: fmti-ner@nic.in

Name of machine	:	Rotavator
Type	:	Multi speed, gear drive, centrally mounted
Make	:	Bhoomi-Darshan
Model	:	2023
Year of manufacture	:	2024
Serial Number	:	BD0002
Recommended power source, hp	:	Tractor - 45 hp & above
Type of blade	:	Hatchet (L-Shaped)
Size (cm) {Rotor Dia.× Working width}	:	47 x 176

4.2 Prime mover used:

Tractor	:	Kubota MU4501 4WD
Chassis No.	:	KBTM30TNHNTH53229
Engine No.	:	BLQ4754
Max. PTO power, kW	:	30.7

4.3 Constructional details (Refer Fig.1):

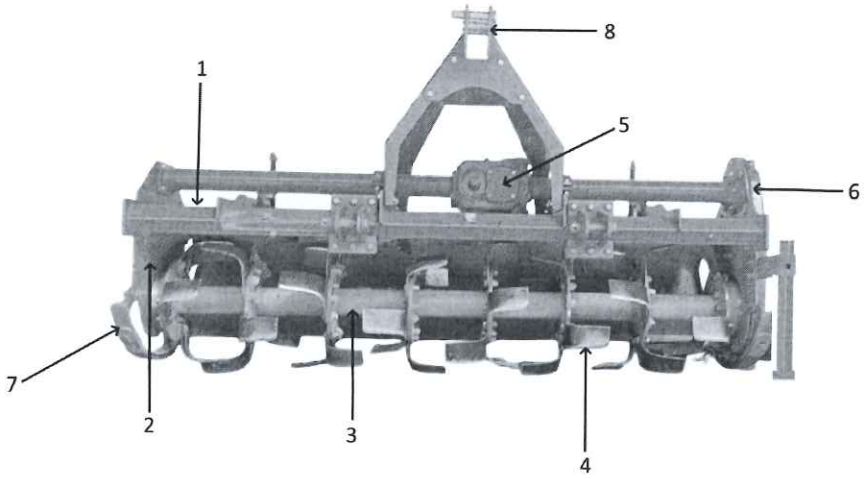


Fig.1 ROTAVATOR, BHOOMI-DARSHAN, 2023

KEYWORDS:

1. Mainframe
2. Side plate
3. Rotor shaft
4. Rotor blade
5. Primary reduction gear box
6. Secondary reduction gear box
7. Skid
8. Hitch pyramid

4.3.1 Main Frame:

Type	:	Fabricated from MS sheet, MS square pipe and MS plate.
Size of box section (mm)	:	1870 x 60.8 x 60.8
Size of supporting flat (mm) {L.H.S and R.H.S}	:	577 x 108 x 10.2 and 576 x 108 x 10.2

Summary of field performance test

Sr. No.	Parameters/operations	Wet land operation (Puddling)	Dry land operation
1	Gear used	L-1	L-1
2	Engine speed (rpm)		
	No load	2650 to 2660	2613 to 2640
	On load	2535 to 2542	2493 to 2537
3	Type of soil	Light	
4	Depth of standing water (cm)/ soil moisture (%)	10.40 to 10.80	11.11 to 13.73
5	Bulk density of soil (g/cc)	--	1.28 to 1.40
6	Speed of operation (kmph)	2.28 to 2.73	2.77 to 2.94
7	Travel reduction (%)/ Wheel slip (%)	2.01 to 6.64	-0.95 to -2.66
8	Depth of puddle (cm)/ Depth of cut (cm)	24.70 to 27.90	10.40 to 11.06
9	Working width (cm)	--	193 to 194
10	Area covered (ha/h)	0.33 to 0.35	0.46 to 0.48
11	Time required for one ha (h)	2.83 to 3.02	2.10 to 2.20
12	Puddling index (%)/ Field efficiency (%)	91 to 92	80.14 to 86.65
13	Power requirement (kW)	NR	26.90 to 28.40
14	Fuel consumption		
	l/h	5.00 to 5.41	6.40 to 6.89
	l/ha	14.18 to 15.34	13.44 to 14.88

7.1 Wet land operation:

The tractor was operated without cage wheel for puddling operation of rotavator.

7.1.1 Quality of work:

a) The depth of puddle was recorded as 24.70 to 27.90 cm.

b) The puddling index was recorded as 91 to 92 %.

7.2 Dry land operation:

7.2.1 Rate of work:

(a) The rate of work was recorded as 0.46 to 0.48 ha/h and the speed of operation were recorded as 2.77 to 2.94 kmph.

(b) The time required to cover one hectare was recorded as 2.10 to 2.20 h.

7.2.2 Quality of work:

(a) The depth of cut was recorded as 10.40 to 11.06 cm.

(b) Working width was observed as 193 to 194 cm.

(c) Field efficiency was observed as 80.14 to 86.65 %.

7.3 Effectiveness of sealing for wet land operation:

After completion of field test in wet land, the rotavator was dismantled for checking the effectiveness of sealing provided against ingress of mud and/or water in various sub-assemblies/components. The observations are given in ensuing Table:

Sr. No.	Location	Whether ingress of mud and/or water was observed (Yes/No)
1	Primary reduction gear box	No
2	Secondary reduction gear box	No
3	Rotor axle bearing cap	No

7.4 Labour requirement:

One skilled operator is needed to operate the tractor with the rotavator.

7.5 Adequacy of power of prime mover as used during test:

The power of the prime mover as used during test was found adequate.

7.6 Wear analysis:

7.6.1 On mass basis:

Wear analysis on mass basis was done after 38.34 hours (wet land & dry land operation and running-in) and the results are as shown below,

Sr. No.	After wet land and dry land operation and running-in		
	Initial mass (g)	Final mass (g)	Percentage of wear (%)
			After 38.34 hours	Per hour
1	987.5	891.0	9.77	0.25
2	982.7	866.6	11.81	0.31
3	985.4	882.1	10.48	0.27
4	967.2	893.7	7.60	0.20
5	980.5	918.7	6.30	0.16
6	990.4	921.4	6.97	0.18
7	992.0	896.9	9.59	0.25
8	989.8	927.0	6.34	0.17

The hourly rate of wear of blade on mass basis after wet land and dry land operations and running-in was recorded as 0.16 to 0.31%.

7.6.2 On dimensional basis (Refer Fig. 7):

Wear analysis on dimensional basis was done after 38.34 hours of wet land & dry land operation and running-in and the results are as shown below,

Sr. No.	Blade width at every 50 mm from outer end								Percentage wear							
	Initial				Final				After 38.34 hour				Per hour			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1	85.20	83.51	83.25	83.65	72.69	75.03	80.49	80.97	14.68	10.15	3.32	3.20	0.38	0.26	0.09	0.08
2	85.16	84.13	83.10	83.98	72.02	74.39	80.30	79.81	15.43	11.58	3.37	4.97	0.40	0.30	0.09	0.13
3	85.35	83.14	82.90	83.75	71.50	73.29	80.41	79.10	16.23	11.85	3.00	5.55	0.42	0.31	0.08	0.14
4	85.72	82.95	82.60	83.47	72.92	75.45	82.51	81.74	14.93	9.04	0.11	2.07	0.39	0.24	0.00	0.05
5	85.60	84.40	82.67	84.76	73.76	75.92	82.37	82.70	13.83	10.05	0.36	2.43	0.36	0.26	0.01	0.06
6	85.16	84.65	82.80	83.10	72.44	75.27	81.70	81.64	14.94	11.08	1.33	1.76	0.39	0.29	0.03	0.05
7	85.27	84.12	82.95	84.08	74.54	77.12	81.60	83.88	12.58	8.32	1.63	0.24	0.33	0.22	0.04	0.01
8	85.16	84.60	83.10	83.94	75.78	77.00	81.59	81.63	11.01	8.98	1.82	2.75	0.29	0.23	0.05	0.07
												Average	**0.37**	**0.26**	**0.05**	**0.07**

The hourly rate of wear of blade on dimensional basis after wet land and dry land operations and running-in was recorded as 0.07 to 0.37%.

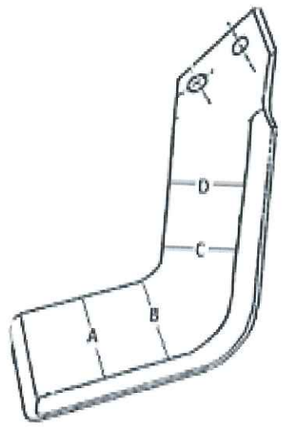


Fig. 7 DIMENSIONS OF BLADE FOR WEAR ANALYSIS

8. EASE OF OPERATION AND ADJUSTMENTS

The operator can easily adjust and control the rotavator from operator's seat in the field as the adjustments are within the easy reach of operator. However, the operator has to get down from the tractor in order to raise/lower the depth adjusting skids.

9. DEFECTS, BREAKDOWNS AND REPAIRS

No breakdown was occurred during 38.34 hours of field performance test (wet land and dry land operation and running-in).

10. PARAMETERS APPLICABLE FOR QUALIFYING MINIMUM PERFORMANCE CRITERIA

Sr. No.	Characteristics	Category Evaluative/ Non-Evaluative	Requirement	Tolerance	As Observed	Whether meets the requirements (Yes/ No)
1	2	3	4	5	6	7
1	**Field Performance**					
i	Suitability for wet land operation	Evaluative	Should be suitable for wet land operation	--	Suitable	Yes
ii	Depth of cut in dry land operation (cm)	Evaluative	Minimum 10 cm	--	10.40 to 11.06	Yes
iii	Depth of puddle in wet land operation(cm)	Evaluative	Minimum 12 cm	--	24.7 to 27.9	Yes
iv	Field efficiency (%)	Evaluative	Minimum 75 %	--	80.14 to 86.65	Yes

1	2	3	4	5	6	7
v	Puddling index (%)	Evaluative	Minimum 65 %	--	91.0 to 92.0	Yes
2	**Safety Requirements**					
i	Safety considerations	Evaluative	Should meet the requirement of IS:10740 and IS:10318	--	Provided	Yes
ii	Safety clutch/ device (shear bolt) in PTO drive shaft	Evaluative	Should be provided	--	Provided	Yes
iii	Rotavator stand	Evaluative	Should be provided	--	Provided	Yes
iv	Rotavator shield to prevent flying of mud and stone	Evaluative	Should be provided	--	Provided	Yes
v	Guard over propeller shaft	Evaluative	Should be provided	--	Provided	Yes
3	**Effectiveness of sealing (presence of ingress of dust and water/ mud in various sub-assemblies)**					
i	Primary reduction gear/ box	Evaluative	No ingress of mud and water	--	No ingress of mud and water	Yes
ii	Secondary reduction gear/box	Evaluative	No ingress of mud and water	--	No ingress of mud and water	Yes
iii	Rotary axle bearing cap	Evaluative	No ingress of mud and water	--	No ingress of mud and water	Yes
4	**Material of construction**					
i	Hardness of blades	Evaluative	High carbon steel, boron steel	--	Boron steel	Yes
ii	Chemical composition of rotor blades	Evaluative	As per IS:6690	--	**Does not conform**	**No**
5	**Dimensional requirements**					
i	Dimension of three point linkage	Non-Evaluative	Should meet IS:4468 (part -I)	--	**Does not conform**	**No**
ii	Dimension of PIC of Implements	Non-Evaluative	Should meet IS:4931	--	**Does not conform**	**No**
iii	Dimensions of PIC yoke bore	Non-Evaluative	Should meet IS:4931	--	**Does not conform**	**No**
6	**Literature (Submission to test agency)**					
i	Operator cum service manual and part catalogue	Evaluative	Should be provided as per IS:8132	--	Provided	Yes
7	**Labelling of Rotavator (provision of labelling plate) as mentioned below and should be welded on rotary tiller (Rotavator)**					
	Parameter					
i	Name and address of the manufacturer	Evaluative	Should be provided on rotary tiller (Rotavator)	--	Provided	Yes
ii	Make			--	Provided	Yes
iii	Model			--	Provided	Yes
iv	Size, (m) {Dia of Rotor X Width of Cut}			--	**Not provided**	**No**
v	Country of origin			--	**Not provided**	**No**
vi	Year of manufacture			--	Provided	Yes

1	2	3	4	5	6	7
vii	Chassis serial number			--	Provided	Yes
viii	Recommended PTO speed of prime mover (rpm)			--	**Not provided**	**No**
ix	Maximum PTO power requirement, kW			--	**Not provided**	**No**
8	**Category of Breakdowns/ Defects**					
	Category of breakdowns	Category Evaluative/ Non-Evaluative	Requirements	As observed	Whether meets the requirements (Yes/ No)	
i	Critical breakdown	Evaluative	No critical breakdown	None	Yes	
ii	Major breakdown	Evaluative	Not more than one and neither of them should be repetitive in nature.	None	Yes	
iii	Minor breakdowns	Evaluative	Not more than three and frequency of each should not be more than two.	None	Yes	
iv	Total breakdowns	Evaluative	In no case, the total no of breakdown should exceed four, i.e. (1 major + 3 minor) or 4 minor breakdowns	None	Yes	

11. CRITICAL TECHNICAL SPECIFICATIONS

(Vide Ministry's letter No. 13-9/2019-(M&T) (I&P)-Part dated 26.04.2019)

Sr. No.	Parameters	Specifications	Observation	Remarks
1	2	3	4	5
1	Working width (mm)	1200 (Min.)	1760	Conforms
2	Type of blade	C/L/J shape as per demand	L - Shape	Conforms
3	Blade overlap, mm	15 (Min.)	0	**Does not conform**
4	Thickness of blade (mm)	7-8 (Min.)	7.18	Conforms
5	No. of blades	30 (Min.)	42	Conforms
6	Total number of flanges	5 (Min.)	8	Conforms
7	Number of blades per flange	6 (Max.)	6	Conforms
8	Outer diameter of rotor shaft, mm	75-90	89.6	Conforms

1	2	3	4	5
9	Rotor diameter, including flange and blade mounted on flange, mm	425 (Min.)	470	Conforms
10	Side drive	Gear drive	Gear drive	Conforms
11	Depth control mechanism	Arc shaped skid on both side of rotavator	Provided	Conforms
12	Material of blades	Boron (28MnCrB5) / High Carbon Steel EN42)	Boron (28MnCrB5)	Conforms
13	Hardness of blade material, HRC	38 (Min.)	47	Conforms
14	Safety clutch / device (Shear bolt) in PTO drive shaft	Must be provided	Provided	Conforms
15	Rotavator stand	Must be provided	Provided	Conforms
16	Guard over propeller shaft	Must be provided	Provided	Conforms
17	Sheet metal	AS36 / IS 2062	MS	**Does not conform**
18	Marking/labeling of machine	The labeling plate should be riveted on the body of machine having name and address of manufacturer, Country of origin, Make, Model, Year of manufacturer, Serial number, Type, Size, required size of prime mover (kW)	Country of origin, size of rotavator and required size of prime mover (kW) were not provided.	**Does not conform**
19	Literature	Operator manual, Service manual and Part catalogue should be provided.	Provided	Conforms

12. COMMENTS AND RECOMMENDATIONS

12.1 Specifications of Hitch Pyramid did not conform to IS: 4468 – 1997 (Part-1). This should be looked into for corrective action.

12.2 Dimensions of PIC of the rotavator did not conform to IS: 4931-1995 and it should be looked into for corrective action.

12.3 Dimensions of PIC yoke bore did not conform to IS: 4931-1995 and it should be looked into for corrective action.

12.4 The hardness and chemical composition of rotary blades did not conform to the requirement of IS 6690:1981 (Reaffirmed 2022). This should be looked into for corrective action.

12.5 The details such as country of origin, size of rotavator and required size of prime mover (kW) were not provided on the labeling plate of the machine. Also, two numbers of labeling plates were provided. However, it is recommended to provide only one labeling plate. This should be looked into for corrective action.

12.6 Blade overlap and material of sheet metal did not conform to critical technical specifications vide Ministry's letter No. 13-9/2019-(M&T) (I&P)-Part dated 26.04.2019. This should be looked into for corrective action.

TESTING AUTHORITY

(M.R. PATIL)
SENIOR AGRICULTURAL ENGINEER

(P. KAMALABAI)
DIRECTOR

Draft test report compiled by - Shri D. Deori, Technical Assistant

13. APPLICANT'S COMMENTS

We have gone through the comments and recommendation as stated in the draft test report and we will take care as per comments and recommendations in our future products.

LD/NERFMTTI, B. Chariali/ 07/07/564	BHOOMI-DARSHAN, 2023 ROTAVATOR	COMMERCIAL (INITIAL)

ANNEXURE-I

FIELD PERFORMANCE RESULTS (WET LAND OPERATION)

Place of test: NERFMTTI Farm, Biswanath Chariali, Dist.- Biswanath, Assam

Tractor used: KUBOTA MU4501 4WD

Sr. No.	Parameters	Test trails		Avg.
		I	II	--
1	Date of test	23.06.25	24.06.25	--
2	Net test duration (h)	5.50	5.16	--
3	Gear used	L-1		
4	Engine speed (rpm)			
	No load	2660	2650	2655
	On load	2535	2542	2539
5	Type of soil	Light		
6	Av. depth of standing water (cm)	10.80	10.40	10.60
7	Previous treatment	Nil		
8	Forward speed (kmph)	2.73	2.28	2.51
9	Av. travel reduction (%)	6.64	2.01	4.33
10	Av. wheel sinkage (cm)	29.3	32.2	30.8
11	Av. depth of puddle (cm)	24.7	27.9	26.3
12	Water over puddle (cm)	4.50	4.50	4.50
13	Puddling index (%)	91	92	92
14	Area covered (ha/h)	0.33	0.35	0.34
15	Time required for one ha (h)	3.02	2.83	2.93
16	Fuel consumption (l/h)	5.00	5.41	5.21
17	Fuel consumption (l/ha)	14.18	15.34	14.76

ANNEXURE-II

FIELD PERFORMANCE RESULTS (DRY LAND OPERATION)

Place of test:

1. NERFMTTI Farm, Biswanath Chariali, Dist.- Biswanath, Assam
2. Village - Kumoliya, Dist- Biswanath, Assam

Tractor used: KUBOTA MU4501 4WD

Sr. No.	Parameters	I	II	III	IV	Avg.
1	Date of test	05.02.26	06.02.26	09.02.26	10.02.26	--
2	Net test duration (h)	7.50	6.84	6.17	6.17	--
3	Gear used	L-1				
4	Engine speed (rpm)					
	No load	2640	2613	2630	2627	2628
	On load	2537	2537	2493	2537	2526
5	Furrow length (m)	64.20	65.60	70.50	70.50	67.70
6	Type of soil	Light				
7	Bulk density (g/cc)	1.40	1.40	1.31	1.28	1.35
8	Soil moisture (%)	12.77	13.73	11.43	11.11	12.26
9	Previous treatment	Nil				
10	Forward speed (kmph)	2.93	2.80	2.77	2.94	2.86
11	Wheel slippage (%)	-1.02	-2.66	-0.95	-1.12	-1.44
12	Av. depth of cut (cm)	10.64	10.40	10.78	11.06	10.72
13	Av. width of cut (cm)	194	194	193	193	194
14	Soil pulverization (cm)	0.75	0.85	0.81	0.88	0.82
15	Area covered (ha/h)	0.46	0.46	0.46	0.48	0.47
16	Power requirement(kW)	28.02	28.40	27.50	26.90	27.71
17	Time required for one ha (h)	2.20	2.17	2.16	2.10	2.16
18	Field efficiency (%)	80.14	84.98	86.65	83.95	83.93
19	Fuel consumption					
	l/h	6.66	6.51	6.89	6.40	6.62
	l/ha	14.65	14.13	14.88	13.44	14.28