COMMERCIAL TEST REPORT

REPORT NO.: IMP-2011/407
MONTH- JUNE 2023

सत्यमेव जयते

"MULTISPEED" ROTAVATOR- 5 FEET
(SINGHAM-SS-165)

TESTED AT

STATE LEVEL FARM MACHINERY TRAINING AND TESTING INSTITUTE, RAHMANKHERA, HARDOI ROAD
LUCKNOW, U.P. - 226101

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 IS VALID FROM 12.06.2023 TO 11.06.2030

TEST REPORT NO.	NAME OF THE MACHINE/IMPLEMENT, MODEL NO.	MONTH	YEAR
IMP-2011/407	"MULTISPEED" ROTAVATOR- 5 FEET (SINGHAM-SS-165)	JUNE	2023

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Type of test	:	COMMERCIAL
Name of machine	:	"MULTISPEED" ROTAVATOR- 6 FEET (SINGHAM-SS-165)
Test Code referred	:	IS: 11531-1995 (REAFFIRMED) TEST CODE FOR PUDDLER. IS: 4468- 2007 (PT.-I)-AGRICULTURAL WHEELED TRACTORS-REAR MOUNTED THREE POINT LINKAGE. IS: 4931-1996 (REAFFIRMED)-TECHNICAL REQUIREMENTS FOR POWER TAKE-OFF SHAFT OF AGRICULTURAL TRACTORS. IS: 6690-2007 (REAFFIRMED)-BLADES FOR ROTAVATOR AND POWER TILLERS.
Test requested by	:	M/S.MOTOR & GENRAL SALES PVT. LTD. A-2/2, UPSIDC INDUSTRIAL AREA DEVA ROAD, CHINHAT, LUCKNOW- 226019
Testing Authority	:	STATE LEVEL FARM MACHINERY TRAINING AND TESTING INSTITUTE, RAHMANKHERA, HARDOI ROAD LUCKNOW, U.P. - 226101
Period of test	:	FEBRUARY 2023 TO JUNE 2023

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 the test was to check and assess the followings.

i) Specification
ii) Hardness & chemical analysis of material of rotavator blades
iii) Field performance under dry and wet land condition with regard to
   a) Rate of work.
   b) Quality of work.
   c) Ease of operation, maintenance & adjustments.
   d) Wear of soil engaging components.

2. TEST PROCEDURE / CODES

i) IS: 11531-1995 (Reaffirmed) Test code for Puddler.
ii) IS: 4468- 2007 (Pt.-I)-Agricultural wheeled tractors-Rear mounted three point linkage.
iii) IS: 4931-1996 (Reaffirmed)-Technical requirements for power take-off shaft of Agricultural Tractors.
iv) IS: 6690-2007 (Reaffirmed)-Blades for rotavator and power tillers.

3. METHOD 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 manufacture's site. Machines of Sr. No UP0472023SS0013 to UP0472023SS0017 were available and Sr. No UP0472023SS0013 was selected for testing.

4. SPECIFICATION

4.1	**General**		
	Name of manufacturer/applicant	:	M/s- Motor & Genral Sales Pvt. Ltd. A-2/2,Upsidc Industrial Area Deva Road, Chinhat, Lucknow- 226019
	Type	:	Tractor Mounted type.
	Make	:	MGS Agricare
	Model	:	SS-165 (Singham Shakti Series)
	Year of manufacture	:	2023
	Serial No.	:	UP0472023SS0013
	Tractor horse power required	:	35 And Above (apa)
	Type of blade	:	L-Shaped (Hatched)
	Working width of implement, mm	:	1710
4.2	**PRIME MOVER USED**		
	Tractor	:	Powertrac Euro-50
	Max. PTO Power Kw	:	34.0
	Year of manufacture	:	2019
4.3	**CHASSIS**		
	Type	:	MS Square
	Size of pipe, mm	:	1650×60×60
	Size of supporting flat, mm	:	528×100×8

	Type of mounting of pipe	:	Fixed to side support with the help of nuts and bolt size (45.29×14.10×1.5)
4.3.1	**SIDE SUPPORT**		
	Type	:	M.S. Plate
	Thickness of plate, mm	:	8.0
	Method of fixing	:	Fixed to the frame with nuts bolts size (44.47×11.58Ø×1.5) and welded with chassis frame.
4.3.2	**SHIELD (COVER)**		
	Type	:	M.S. sheet supported with M.S. flate
	Curved width, mm	:	1650×475
	Thickness of sheet, mm	:	5.0
	Method of mounting	:	Welded with supporting plate of chassis.
4.4	**TRAILING BOARD**		
	Type & material	:	M.S. sheet supported with M.S. flate
	Size of board, mm	:	1800×510
	Thickness of sheet, mm	:	3.0
	Locking system	:	03 clamps welded to chassis frame. The board is held in position by locking the fixing bracket through spring loaded rod.
	Method of mounting plate sector	:	Bolted to flate of chassis frame
	Type of hinge	:	M.S. bush
	No. of hinge	:	Two
	Method of fixing	:	One M.S. rod is passing through M.S. bush and fixed at both the end with main chassis frame.

4.5	**ROTOR SHAFT**		
	Material	:	M.S. pipe
	Type of rotor axle	:	Tubular section with disc flanges for mounting the blades.
	Size of shaft, mm Length Dia.	 : :	 1580 73.0
	No. of flanges	:	09
	Type of flange	:	M.S. circular plate
	Dia. of flange, mm	:	213
	Thickness of flange, mm	:	12
	No. of blades on each flange	:	03 end to end & 06 in an flange respectively.
	Method of mounting blades on flanges	:	Each blade is mounted with the help of two no. of bolts and nuts size (34×11.52×1.5) mm.

	Distance of between two flanges, mm	:	195
	Total no. of blades	:	48
	Dia. of rotor with blades, mm	:	442
	Method of fixing	:	Rotor shaft is bolted with hubs on both ends. These hubs are centrally mounted with two ball bearings on each ends.
4.5.1	**ROTOR BLADE**		
	Number	:	48
	Type	:	L-shape hatched
	Material	:	Carbon steel
	Overall thickness, mm	**:**	7.6
	Thickness at the beveled edge, mm	**:**	1.96
	Length of the beveled edge, mm	**:**	20.16

4.6	**Depth of control mechanism**		
4.6.1	**Skid**		
	Type & Material	:	Curved shape, M.S. double flat
	Size, mm	:	554×48×10 & 555×50×10 respectively.
	No. of skid	:	2.0
	Method of fixing	:	Skid is bolted to side plate and adjusting rack at the front & rear side respectively with the help of bolt & nut size (61.65×10.72×1.5)
4.6.2	**Adjusting Rack**		
	Type	:	M.S. sliding plate.
	Size, mm	:	259×54×5
	No. and size of locking bolt, mm	:	2 and size of locking bolt (64.40×11.82×1.5)
	Range of depth adjustment, mm	:	0-115
	Method of fixing	:	M.S. flat is fixed to upper end of the skid and lower end to the side support on both sides. This is fit to side plate with nut and bolts size of (35.47×11.65Ø×1.5) mm.

4.7	**Three point linkage (Cat. II) (Refer fig.1)**			
Sl. No.	**Specification**	**As per IS:4468-2007 (pt.- I) (mm)**	**As measured mm**	**Remarks**
I	**Upper hitch points**			
(a)	Diameter of hitch pin (A)	25.27 to 25.40	25.35	Conforms
(b)	Diameter of hitch pin hole(B)	25.70 to 25.91	25.60	**Does not conforms**

(c)	Width between outer faces of yoke (E)	86 (Max.)	69.80	Conforms
(d)	Width between inner faces of yoke (F).	52 (min)	53.36	Conforms
(e)	Linch pin hole distance(D)	93(min)	102.44	Conforms
II	**Lower hitch points**			
(a)	Dia. of hitch pin	27.79 to 28.0	27.94	Conforms
(b)	Linch pin hole distance (K)	49 (Min.)	89.53	Conforms
III	**Diameter of linch pin hole**			
(a)	Upper hitch pin (L)	12(min)	12.19	Conforms
(b)	Lower hitch pin	12(min)	12.04	Conforms
IV	**Mast height (M)**	510 (min.)	590	Conforms
V	**Lower hitch point span (N)**	823.5 to 826.5	828 (but adjustable)	Conforms

4.7.1	**Mast**		
	Type	:	M.S. plate and flat fabrication
	Size of flat, mm	:	705×330×8 (Rear) & 689×179×8 (Front) side respectively.
	Shape	:	Pyramid

4.8	**Power transmission system:**		
	Method of transmission	:	Propeller shaft receives drive from PTO and transmits power to rotary shaft through two spur gear & one Pinion beveled gear reduction units, primary and secondary, consisting of gear reduction respectively.

4.8.1	**Dimensions of power input shaft (Ref. Fig. 2)**		
Notation	**As per IS:4931-1996 (mm)**	**As observed (mm)**	**Remarks**
D ǿ	34.79 ± 0.06	34.91	**Does not conforms**
d ǿ	28.91 ± 0.05	28.96	Conforms
S	8.69 (max.)	8.81	**Does not conforms**
R	6.7 ± 0.25	5.20	**Does not conforms**
ά	30º	28º	**Does not conforms**
Q	7.0	7.0	Conforms
H	38.0	38.0	Conforms
A	54.0 (min.)	60.37	Conforms
B	76.0 (min.)	76.49	Conforms

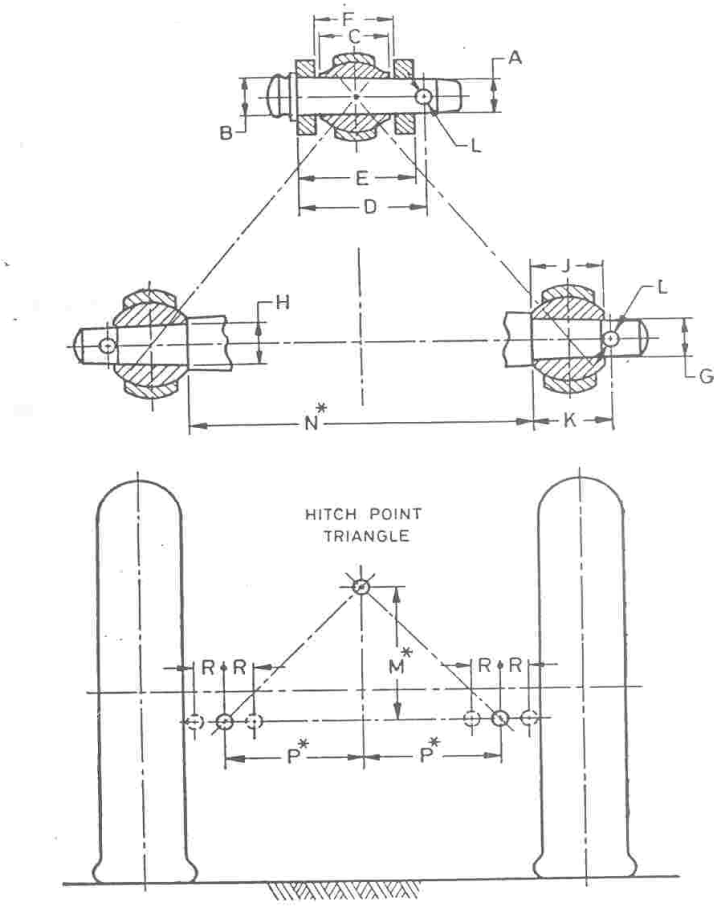

Fig.:1 Dimension of Hitch Points

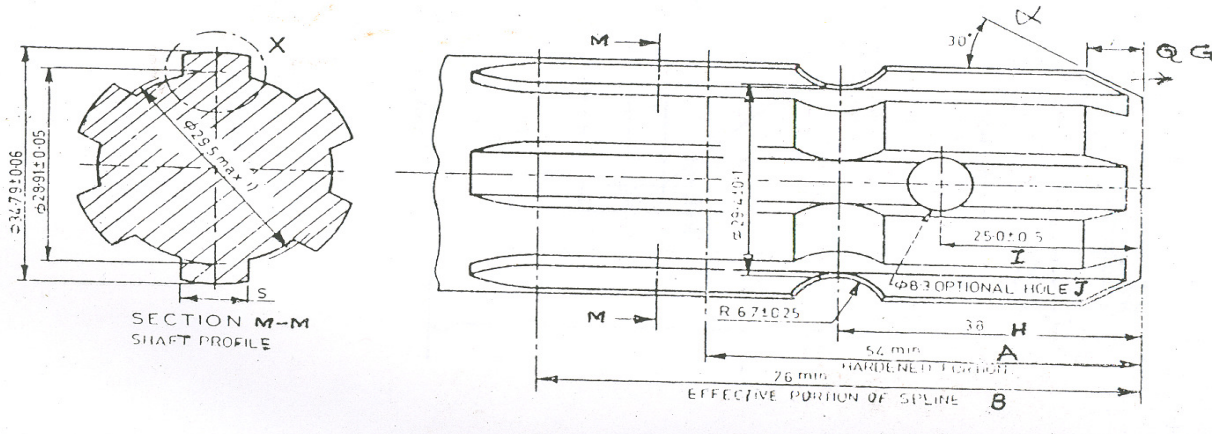

Fig. 2: Dimensions of Rotavator Power Input Shaft, mm

4.8.2	**Gear box Assembly (primary reduction) Multispeed gear box**		
	Type	:	Bevel pinion gear
	No. of teeth on pinion	:	13
	No. of teeth on bevel gear	:	25
	Reduction ratio at gear box	:	1 : 0.52
	Oil capacity, l	:	4.0
	Oil change period	:	After every 200 hours
	Recommended grade of oil	:	EP-140
	Length of power transmission shaft, mm (from gear box to secondary reduction unit)	:	725
	Dia. of shaft, mm	:	48.0
	No. of bearing	:	05-Tapper Roller bearing (30207-Three) (One-32210) & (One-32211).
4.8.2.1	**Gear drive (secondary reduction)**		
	Type	:	Gear drive
	No. of teeth drive gear	:	35
	No. of teeth driven idler spur gear	:	23
	No. of teeth driven spur gear	:	30
	Reduction ratio at gear box	:	1 : 0.86
	Oil capacity, l	:	4.0
	Recommended grade of oil, apa	:	EP-140
	Oil change period, h (apa)	:	After every 200 hours
	Provision for oil level checking	:	Bolt Provided
	Provision for dipstick/breather	:	Breather Provided
	No. of bearing	:	Four-three tapper bearing (two-32007 & one- 30210), one ball bearing (6311) on rotor shaft
4.8.3	**Propeller shaft**		
	Type	:	Telescopic (in two segments having 6 splines at both ends)
	Length of shaft (mm)		
	-- Minimum	**:**	780
	-- Maximum	**:**	940
	Mass of shaft, kg	**:**	19.400
	Provision for locking	:	Provided

4.8.3.1	**Propeller shaft hub dimensions (Ref. Fig.3)**		
Notation	**As per IS:4931-1996 (mm)**	**As observed (mm)**	**Remarks**
D ǿ	34.93± 0.03	34.87	**Does not conforms**
d ǿ	29.7± 0.1	30.39	**Does not conforms**
W	8.69 (min)	8.84	Conforms
B	54 (min)	61.33	Conforms

4.8.4	**Safety clutch/device**	**:**	Provided
4.9	**Rotavator Stand**	**:**	Provided
4.10	**Furrow wheel**	**:**	Provided

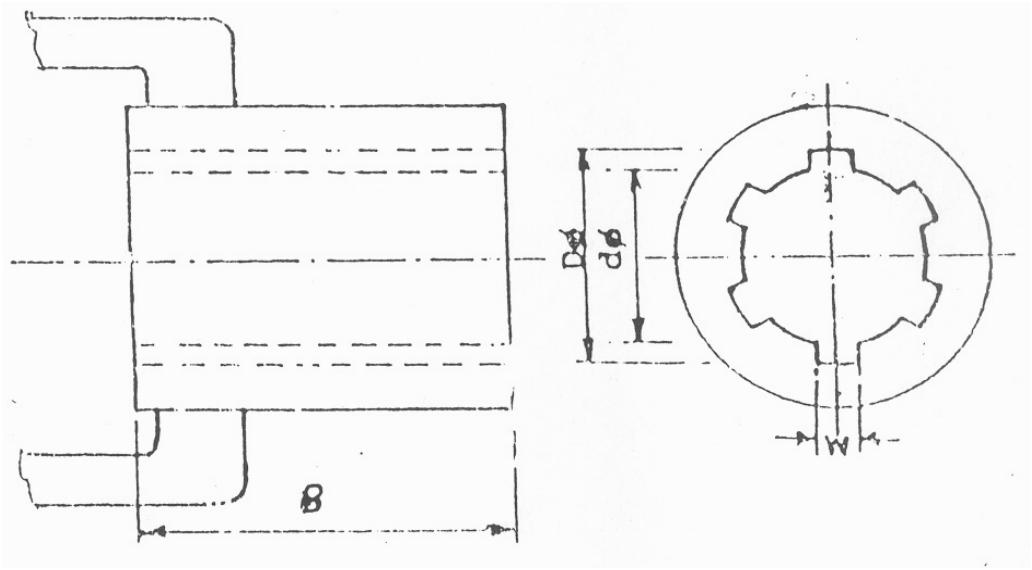

Fig. 3: Propeller Shaft Insert Dimensions, (mm)

4.11	**Overall Dimensions, mm (Ref. Fig.4)**		
	Length	:	1030
	Width	:	1840
	Height	:	1100
	Weight, Kg	:	380
4.12	Color	:	Orange

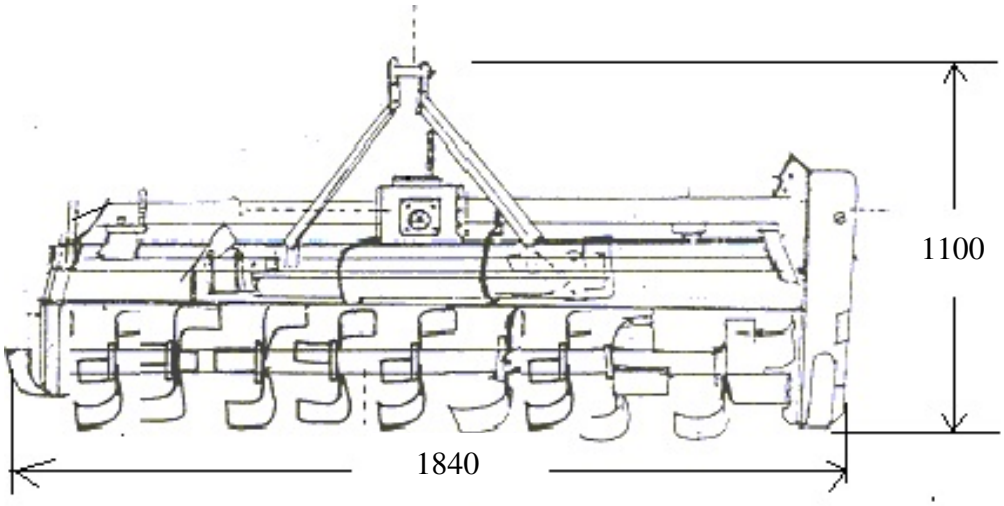

Fig. 4: Overall Dimensions of Rotavator, mm

5. LABORATORY TEST

5.1 The hardness of blades was determined at edge and shank portion. The results of hardness test are tabulated in Table-I.

TABLE-1

S. No	Portion of blade	Hardness (HRC)		Remark
		As per IS:6690-2007	As observed	
1-	On Shank Portion	37-45	38-41	Conforms
2-	On Edge Portion	53±3	52-55	Conforms

5.2 Chemical composition

The chemical composition of blades is tabulated in Table-2

TABLE-2

Sl. No.	Material	Requirement as per IS:6690-1996 (Reaffirmed) (% by weight)	As observed (% by weight)	Remark
1.	Carbon (C)	0.50 to 0.60	0.60	Conforms
2.	Silicon (Si)	1.50 to 2.0	1.58	Conforms
3.	Manganese (Mn)	0.50 to 1.0	0.80	Conforms
4.	Sulphur (S)	0.05 (max.)	0.008	Conforms
5.	Phosphorous (P)	0.05 (max.)	0.031	Conforms

6 FIELD PERFORMANCE TEST

The field tests of the implement comprising of dry and wet land operation were conducted for 37.9 hours respectively each in different soil moisture conditions to assess the performance of the implement. The details of tractor used for field operations are given in annexure I.

The tractor PTO speed was maintained at 540±10 rpm. The performance of implement is reported in Annexure-II and summarized in Table-3

TABLE-3

Summary of field performance

Sl. No.	Parameters	Dry land operation	Wet land operation
i	Tractor used	Powertrac Euro-50	
ii	Type of soil	Sandy loam	
iii	Av. Soil moisture, %	15.5 to 17.5	---
iv	Av. Depth of standing water, cm	---	9.0 to 9.17
v	Puddling Index, %	---	81.50 to 82.50
vi	Av. Speed of operation, kmph	3.51 to 3.75	3.33 to 3.66
vii	Field efficiency, %	68.03 to 71.52	--
viii	Av. Depth of cut/depth of puddle, cm	9.23 to 10.50	11.33 to 3.66
ix	Av. Working width, m	1.72 to 1.76	---

x	Area covered, ha/h	0.432 to 0.461	---
xi	Time required for one hectare, h	2.17 to 2.31	---
xii	Fuel consumption		
	- l/h	4.350 to 4.450	4.400 to 4.580
	- l/ha	9.548 to 10.164	---

6.1 Rate of Work

6.1.1 Dry Land Operation

-The rate of work in sandy loam soil was recorded as 0.432 to 0.461 ha/h and the forward speed as 3.51 to 3.75 kmph.

-The time required to cover one hectare area was recorded as 12.17 to 2.31 h.

6.1.2 Wet Land Operation

-Speed of operation varied from 3.33 to 3.66 kmph.

6.2 Quality of Work

6.2.1 Dry land operation

-The depth of operation was recorded as 9.23 to 10.50 cm.

-The field efficiency was recorded as 81.50 to 82.50 %.

6.2.2 Wet Land Operation

-Depth of puddle was recorded as 11.33 to 3.66 cm.

-Puddling index was recorded as 81.50 to 82.50 %.

6.2.3 Fuel consumption Dry and wet land operation

- l/h	4.350 to 4.450	4.400 to 4.580
- l/ha	9.548 to 10.164	---

6.3 WEAR OF BLADES

6.3.1 On Mass basis

Wear of hatchet blades on mass basis after 37.9 hrs. Of field operation are tabulated in Table-4.

TABLE-4

Sl.No.	Initial mass of blade (g)	Mass after 37.9 h of operation (g)	Loss in mass		Wear / h (%)
			g	%	
1.	800	765	35	4.37	0.11
2.	790	770	20	2.53	0.06
3.	790	750	30	3.84	0.08
4.	780	755	25	3.20	0.08
5.	770	745	25	3.24	0.08
6.	810	775	35	4.32	0.11
7.	800	780	20	2.5	0.06
8.	790	765	25	3.16	0.08
9.	790	750	40	5.06	0.13

Rate of hourly wear (%) on mass basis was observed as 0.06 to 0.13 (%)								
6.3.2	**Wear On Dimensions basis Fig. 5: (L-Type hatchet Blade)**							
Sl. No.	**Initial Width at, mm**		**Width after 37.9 hrs. at, mm**		**Wear, % on dimension basis**			
	A (at tip)	**B (65 mm from edge)**	**A (at tip)**	**B (65 mm from edge**	**A (at tip)**	**B (65 mm from edge)**	**A (at tip)**	**B (65 mm from edge)**
1.	70.72	72.12	67.47	70.22	3.30	1.90	4.66	2.63
2.	70.93	71.92	98.73	70.07	2.20	1.85	3.10	2.57
3.	70.83	71.96	68.43	69.96	2.40	2.00	3.88	2.77
4.	69.56	71.67	67.26	69.82	2.30	1.85	3.30	2.58
5.	71.00	71.52	68.75	69.52	2.25	2.00	3.16	2.79
6.	69.71	71.77	67.76	70.82	1.95	0.95	2.79	1.32
7.	70.81	71.83	68.21	69.53	2.60	2.30	3.67	3.20
8.	69.97	71.74	67.52	69.54	2.45	2.15	3.51	2.99
9.	70.29	71.43	68.19	69.33	2.10	2.10	2.98	2.93
Remark: The wear percentage of blade on dimension basis in wet & dry land opreated was recorded as 2.79 to 4.66 & 1.32 to 3.20 (%) at 65mm from edge respectively.								

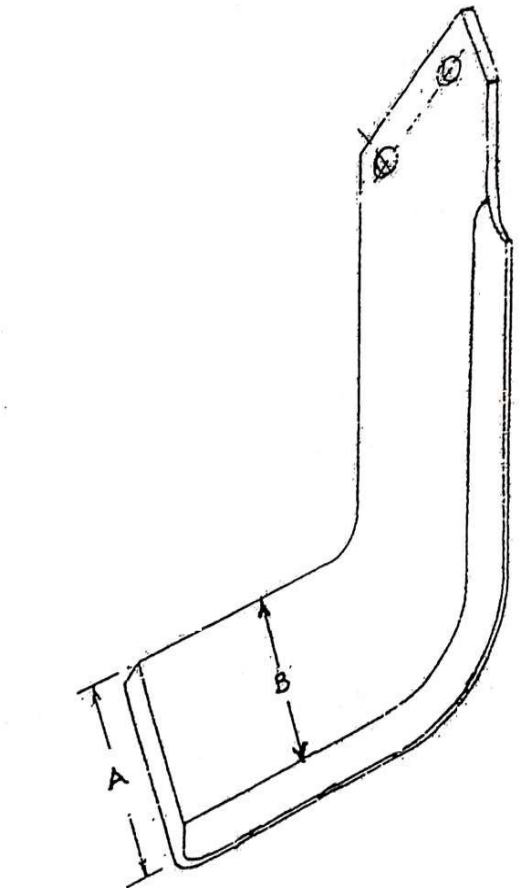

Fig. 5: Dimensions for Wear Analysis

7. EFFECTIVENESS OF SEALINGS

After completion of field test in wet land operation for 16.5 hrs. The implement was dismantled for checking effectiveness of sealing provided against ingress of dust and water/mud in various sub-assemblies and also to check the conditions of components of the Rotavator.

Sl.No.	Location	Whether ingress of mud and/or water was observed
1.	Primary reduction gear box.	No
2.	Secondary reduction gear; drive	No
3.	Hub of rotor assembly	No

8. EASE OF OPERATION, ADJUSTMENTS & SAFETY

8.1 Neither the implement nor the drive the shaft (universal coupling shaft) is provided with safety clutch/device.

8.2 The propeller shaft has telescopic sections with universals joints, to adjust the length of drive shaft which is adequate.

8.3 Depth adjustment can be made by raising or lowering the skids.

9. DEFECTS, BREAKDOWNS AND REPAIRS

9.1 No breakdown occurred during 37.9 h operation in the field.

10. COMMENTS & RECOMMENDATIONS

i) The dimensions of three point linkage system Upper hitch point (b) are not conforming to the requirement of As per IS: 4468-2007 (pt.- I) (mm)

ii) Dimensions of power input shaft notation (Dǿ, S, R, ά) & corresponding propeller shaft hub notation (Dǿ, dǿ,) have not been provided as per requirements of IS:4931-1996 (mm)

iii) 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.

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11. LITERATURE :

The specification of the implement operating manual, maintenance, safety instruction and spare parts catalogue provided in English. The literature developed is found to be adequate for the guidance of user and service personal. However, it need to developed (as per IS: 8132: 1999) in other regional languages.

12. APPLICANT'S COMMENTS:

- We will modify the dimensions of three point linkage system point (b) to comply with the requirement of As per IS: 4468-2007 (pt.- I) (mm) at our production level before the commercial used
- We will modify the dimensions of power input shaft notation (Dǿ,S,R,a) & propeller shaft hub notation (Dǿ, dǿ,) to comply with the requirement of As per IS: 4931-1996 (mm) at our production level before the commercial sale of rotavator.
- We will provide permanently display the quality and parameters on the machine. Before the commercial sale of machine

This report is being issued with the condition that the tested implement will be rectified as per recommendation and comments given by the Institute and applicant respectively and after rectification the implement should be manufactured on commercial basis.

TESTING AUTHORITY

(UPENDRA KUMAR) -SENIOR TECHNICAL ASSISTANT-	
(ANAND CHAUDHARI) -TEST ENGINEER-	
(VIJAY KUMAR SINGH) -ASSOCIATE PROFESSOR – ENGG.	
(DR. PRAMOD KUMAR GUPTA) -ADDITIONAL DIRECTOR-	
(DR. PANKAJ TRIPATHI) - DIRECTOR-	

THIS TEST REPORT IS VALID FROM 12.06.2023 TO 11.06.2030

ANNEXURE-1

BRIEF SPECIFICATIONS OF THE TRACTOR USED DURING FIELD TEST

1	Make, model and type	Powertrac Euro-50
2	Number of cylinders	3
3	Maximum PTO power, Kw	34.0
4	Power at standard Power Take-Off speed, 540± 10 rpm, Kw	28.1
5	Rated engine speed, rpm	2200
6	No load engine speed during field test, rpm	1800
7	Drawbar power, Kw	23.1
8	**Drawbar pull, kN :**	
	- Without ballast	13.5
	- With ballast	18.6
9	Type of wheel equipment	Pneumatic
10	**Number & size of tyre :**	
	Front	6.00-16 PR
	Rear	12.4- 28-12 PR
11	Standard track width, mm :	
	- Front	1320-1860
	- Rear	1252-1870
12	Wheel base, mm	2000
13	Ballast condition	Used as un-ballasted
14	**Total Operational Mass, kg :**	
	- Front	720
	- Rear	1155
	- Total	1870

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ANNEXURE- II

OBSERVATION SHEET OF FIELD TESTING (DRY LAND OPERATION)

Type of soil : Sandy loam
Place of test : Institute Farm, Rehmankhera
Tractor used : Powertrac Euro-50
Gear used : L-2

Test No.	Date of test	Duration of test, (h)	Length of furrow, (m)	Av. Soil moisture (%)	Av. Speed of operation (kmph)	Wheel slip (%)	Av. Depth of cut (cm)	Av. Working width (m)	Area covered (ha./h)	Field efficiency (%)	Time required for one hectare, (h)	Fuel consumption	
												(l/h)	(l/ha)
1	**2**	**3**	**4.**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1.	28.03.23	7.6	90.00	15.5	3.63	3.5	9.23	1.75	0.432	68.03	2.31	4.400	10.164
2.	29.03.23	8.1	92.00	17.5	3.51	4.00	10.17	1.76	0.442	71.52	2.26	4.300	9.831
3.	30.03.23	5.7	90.00	16.5	3.75	2.9	10.50	1.72	0.461	71.47	2.17	4.400	9.548

IMP- 2011/407	"MULTISPEED" ROTAVATOR- 5 FEET (SINGHAM-SS-165)	COMMERCIAL	15

ANNEXURE-III

OBSERVATION SHEET OF FIELD TESTING (PUDDLING OPERATION)

Type of soil : Sandy loam
Place of test : Institute Farm, Rehmankhera
Tractor used : Mahindra-475 (DI)
Gear used : L-2

Test No.	Date of test	Duration of test (h)	Av. Depth of standing water (cm)	Puddling Index (%)	Av. Depth of puddle (cm)	Av. Speed of operation (kmph)	Wheel slip (%)	Fuel consumption	Engine speed (rpm)	
								(l/h)	On load	No load
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1.	31.03.23	7.2	9.07	82.00	11.33	3.46	4.5	4.450	1800	1900
2.	03.04.23	5.8	9.00	82.50	11.73	3.66	3.67	4.480	1800	1900
3.	05.04.23	3.5	9.17	81.50	11.53	3.33	4.0	4.400	1800	1900

ANNEXURE –IV

SYMBOL AND ABBREVIATIONS

SYMBOLS:

I-	**SYMBOLS ASSIGNED TO BASIC SI UNITS**		
S.N.	**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**		
S.N.	**PHYSICALQUANTITY**	**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	h
5	Volume	Cubic centimeter	cm^3
		Milliliter	ml
		Liter	l
6	Minimum	Min	Min
7	Maximum	Max	Max

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	:	rpm