



**“MULTISPEED” ROTAVATOR SKRT-7 FEET  
(SONAKING)**

**TESTED AT**

**STATE LEVEL FARM MACHINERY TRAINING AND TESTING  
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(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 26.09.2022 TO 25.09.2029**

TEST REPORT NO.	NAME OF THE MACHINE/IMPLEMENT, MODEL NO.	MONTH	YEAR
IMP- 2011/380	“MULTISPEED” ROTAVATOR SKRT-7 FEET (SONAKING)	SEPTEMBER	2022



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Type of test	:	COMMERCIAL
Name of machine	:	“MULTISPEED” ROTAVATOR SKRT-7 FEET (SONAKING)
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: 6690-1996 (Reaffirmed)-Blades for Rotavator and Power Tillers.
Test requested by	:	M/S- DELUX AGRO TECH PRIVATE LIMITED, HALLU SARAI OPP. ALLAHABAD BANK, SAMBHAL- UTTAR PRADESH- 244302
Testing Authority	:	STATE LEVEL FARM MACHINERY TRAINING AND TESTING INSTITUTE, REHMANKHERA, HARDOI ROAD, LUCKNOW, U.P. - 226101
Period of test	:	NOVEMBER 2021 TO SEPTEMBER 2022

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1. This Test Report should not be reproduced in part or full without prior permission of the Incharge Testing Centre.
  2. The data given in the Test Report pertain to the particular machine submitted for test by the Applicant.
  3. The data collected during the test do not in any way attribute to the durability of the machine.
  4. The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.
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### Selected Conversions

S. No	Units	Conversion Factor
<b>1</b>	<b>Force</b>	
	1 kgf	9.80665 N
		2.20462 lbf
<b>2</b>	<b>Power</b>	
	1 hp.	1.01387 metric hp. (Ps)
		745.7 W
	1 Ps	735W
	1 kW	1.35962 Ps
<b>3</b>	<b>Pressure</b>	
	1 psi	6.895 kPa
	1 kgf/cm <sup>2</sup>	98.067 kPa = 735.56 mm of Hg
	1 bar	100 kPa = 10 N/cm <sup>2</sup>
	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: 6690-1996 (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 manufacturer's site. Machines of Sr.no.0001 to Sr. No 0005 were available and sr.no. 0001 was selected for testing.

### 4. SPECIFICATION

<b>4.1</b>	<b>General</b>		
	Name of manufacturer/applicant	:	M/S- Delux Agro Tech Private Limited, Hallu Sarai Opp. Allahabad Bank, Sambhal- Uttar Pradesh- 244302
	Type	:	Tractor Mounted type.
	Make	:	Sonaking Deluxe.
	Model	:	SKRT- 7 FEET
	Year of manufacture	:	2021-22
	Serial No.	:	0001
	Tractor horse power required (apa.)	:	45-50
	Type of blade	:	L-Shape hatched Blade.
	Working width of implement, mm	:	2020
<b>4.2</b>	<b>PRIME MOVER USED</b>		
	Tractor	:	Massy ferguson 7250
	Chassis No.	:	MEA8A163CL1263857
	Max. PTO Power Kw	:	2020
	Year of manufacture	:	39.0
<b>4.3</b>	<b>CHASSIS</b>		
	Type	:	M.S. Square pipe.
	Size of pipe, mm	:	2095×60×60
	Size of supporting flat, mm	:	621×115×8.0

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	Type of mounting of pipe, mm	:	Fixed to side support with the help of nut and bolt size (37.62×13.68×1.5 mm)
<b>4.3.1</b>	<b>SIDE SUPPORT</b>		
	Type	:	M.S. flat.
	Thickness of plate, mm	:	8 & 10.0 (Secondary gear drive side)
	Method of fixing, mm	:	Fixed to the frame with nuts bolts size (38.48×13.5×1.5 mm) and welded with chassis frame.
<b>4.3.2</b>	<b>SHIELD ( COVER )</b>		
	Type	:	M.S. Flat.
	Curved width, Length mm	:	535×2090
	Thickness of sheet, mm	:	5.0
	Method of mounting	:	Welded with supporting plate of chassis.
<b>4.4</b>	<b>TRAILING BOARD</b>		
	Type & material	:	M.S. sheet supported with M.S. flat.
	Size of board, mm	:	2230×560
	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 flat of chassis frame.
	Type of hinge	:	Spring Loaded Rod.
	No. of hinges	:	04
	Method of fixing	:	M.S. rod is passing through M.S. bush and fixed at both the end with main chassis frame.

<b>4.5</b>	<b>ROTOR SHAFT</b>		
	Material	:	M.S. pipe.
	Type of rotor axle	:	Tubular section with disc flanges for mounting the blades.
	Size of shaft, mm	:	
	Length	:	1795
	Dia.	:	90.0
	No. of flanges	:	03
	Type of flange	:	M.S. circular plate.
	Dia. of flange, mm	:	232
	Thickness of flange, mm	:	11.5
	No. of blades on each flange	:	06 in each flange.
	Method of mounting blades on flanges, mm	:	Each blade is mounted with two nuts bolts size (37.76×12.60×1.5 mm).
	Distance of between two flanges, mm	:	250
	Total no. of blades	:	48

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	Dia. of rotor with blades, mm	:	431
	Method of fixing	:	Rotor shaft is bolted with hubs on both ends. These hubs are centrally mounted with two ball bearings on each ends.
<b>4.5.1</b>	<b>ROTOR BLADE</b>		
	Number	:	48
	Type	:	L-shape hatched.
	Material	:	High Carbon steel.
	Overall thickness, mm	:	6.84
	Thickness at the beveled edge, mm	:	2.4
	Length of the beveled edge, mm	:	21.0

<b>4.6</b>	<b>Depth of control mechanism</b>		
<b>4.6.1</b>	<b>Skid</b>		
	Type & Material	:	Curved shape, M.S. double flat.
	Size, mm	:	550×50×8 & 470×50×8 Respectively.
	No. of skid	:	02
	Method of fixing	:	Skid is bolted to side plate and adjusting rack at the front & rear side respectively with the help of bolt & nut.
<b>4.6.2</b>	<b>Adjusting Rack</b>		
	Type	:	M.S. casting having.
	Size, mm	:	191×43×10
	No. and size of locking bolt, mm	:	02, (37.76×12.60×1.5)
	Range of depth adjustment, mm	:	0 to 85
	Method of fixing, mm	:	M.S flat is fixed to upper end of the rack fixed to the side support on both sides and lower ends with the skids. This is fit to side plate with nut and bolts size (37.76×12.60×1.5)

<b>4.7</b>	<b>Three point linkage (Cat. II) ( Refer fig.1)</b>			
<b>Sl. No.</b>		<b>As per IS:4468-2007 (pt.- I) (mm)</b>	<b>As measured mm</b>	<b>Remarks</b>
<b>I</b>	<b>Upper hitch points</b>			
(a)	Diameter of hitch pin (A)	25.27 to 25.40	25.21	<b>Does not conform</b>
(b)	Diameter of hitch pin hole(B)	25.70 to 25.91	27.21	<b>Does not conform</b>
(c)	Width between outer faces of yoke (E)	86 (Max.)	81.44	Conforms
(d)	Width between inner faces of yoke (F).	52 (min)	64.94	Conforms
(e)	Linch pin hole distance(D)	93(min)	106.5	Conforms
<b>II</b>	<b>Lower hitch points</b>			
(a)	Dia of hitch pin	27.79 to 28.0	27.29	<b>Does not conform</b>
(b)	Linch pin hole distance (K)	49 (Min.)	106.0	Conforms

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<b>III</b>	<b>Diameter of linch pin hole</b>			
(a)	Upper hitch pin (L)	12(min)	10.10	<b>Does not conform</b>
(b)	Lower hitch pin	12(min)	10.0	<b>Does not conform</b>
<b>IV</b>	<b>Mast height (M)</b>	510 (min.)	570	Conforms
<b>V</b>	<b>Lower hitch point span (N)</b>	823.5 to 826.5	760 (but adjustable)	Conforms

<b>4.7.1</b>	<b>Mast</b>			
	Type	:	M.S. flat fabrication.	
	Size of flat, mm	:	Front- 883×280×9 & Rear- 640×250×9	
	Shape	:	Pyramid.	

<b>4.8</b>	<b>Power transmission system:</b>			
	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.	

<b>4.8.1</b>	<b>Dimensions of power input shaft (Ref. Fig. 2)</b>			
<b>Notation</b>	<b>As per IS:4931-1996 (mm)</b>	<b>As observed (mm)</b>	<b>Remarks</b>	
D $\phi$	34.79 $\pm$ 0.06	34.76	Conforms	
d $\phi$	28.91 $\pm$ 0.05	28.08	<b>Does not Conform</b>	
S	8.69 (max.)	8.40	Conforms	
R	6.7 $\pm$ 0.25	5.82	<b>Does not Conform</b>	
$\alpha$	30°	30°	Conforms	
Q	7.0	7.89	<b>Does not Conform</b>	
H	38.0	38.0	Conform	
A	54.0 (min.)	61.9	Conforms	
B	76.0 (min.)	80.69	Conforms	

**The Dimensions of power input shaft does not Conform as per IS: 4931-1996 (mm)**



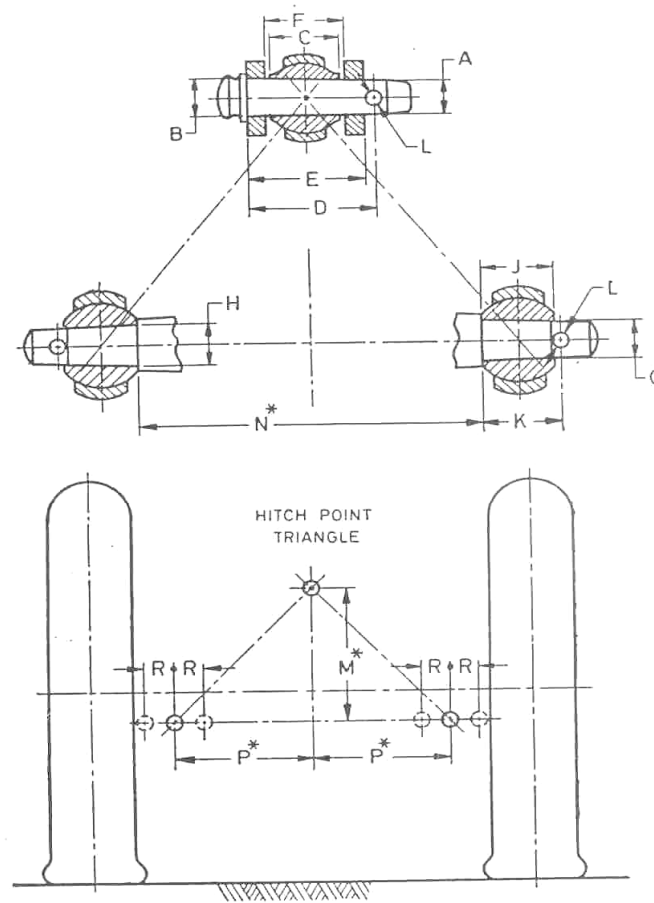


Fig.:1 Dimension of Hitch Points

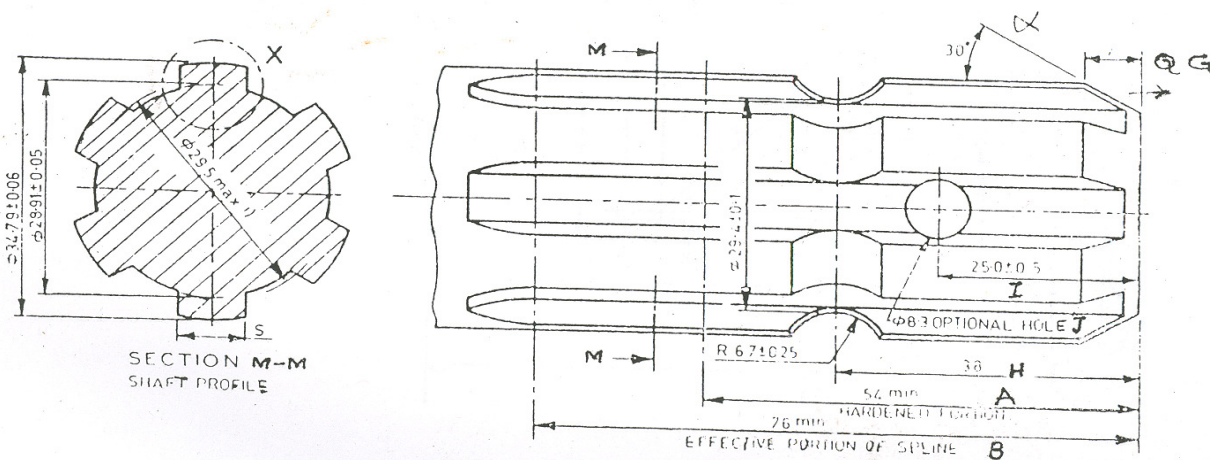


Fig. 2: Dimensions of Rotavator Power Input Shaft, mm

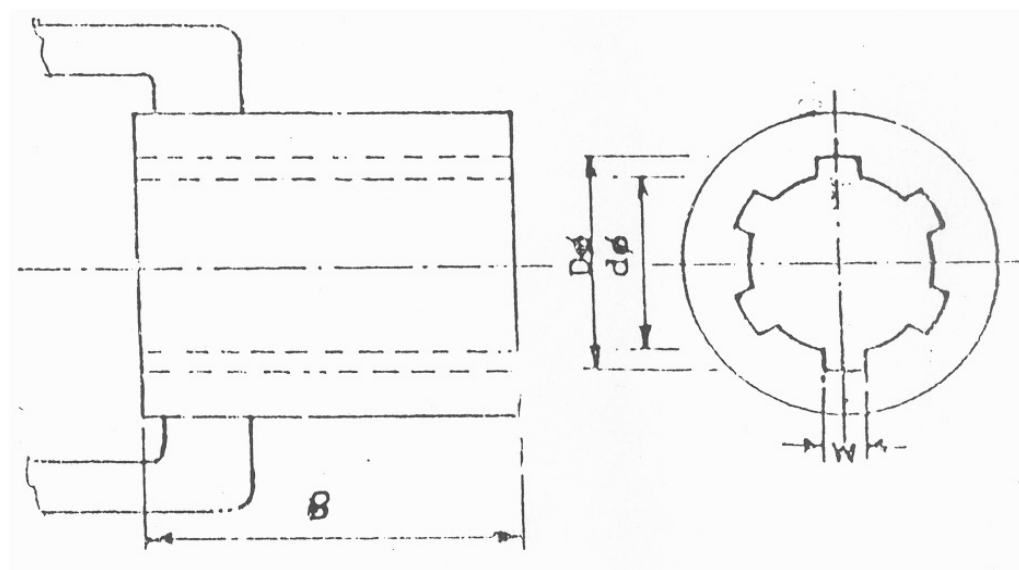
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<b>4.8.2</b>	<b>Gear box Assembly (primary reduction) Multispeed gear box</b>		
	Type	:	Bevel pinion gear.
	No. of teeth on pinion	:	13
	No. of teeth on bevel gear	:	23
	Reduction ratio at gear box	:	1:0.56
	Oil capacity, l	:	3.5
	Oil change period hours	:	After every 200 hrs.
	Recommended grade of oil	:	EP-140
	Length of power transmission shaft, mm (from gear box to secondary reduction unit)	:	445
	Dia. of shaft, mm	:	53.75
	No. of bearing		05- Tapper Roller, Two-30209, Two 32210 (One), 32214.
<b>4.8.2.1</b>	<b>Gear drive ( secondary reduction )</b>		
	Type	:	Gear Drive
	No. of teeth drive gear		20
	No. of teeth driven idler spur gear	:	35
	No. of teeth driven spur gear		28
	Reduction ratio at gear box	:	1:0.71
	Oil capacity, l	:	3.5
	Recommended grade of oil, apa	:	EP-140
	Oil change period, h (apa)	:	After every 200 hrs.
	Provision for oil level checking	:	Provided.
	Provision for dipstick/breather	:	Provided.
	Oil filling arrangement	:	Provided.
	No. of bearing	:	04- (02) Tapper Roller 30209 (One) ball bearing 6311, (One) 30210.
<b>4.8.3</b>	<b>Propeller shaft</b>		
	Type	:	Telescopic (in two segments having 6 splines at both ends).
	<b>Length of shaft (mm)</b>		
	-- Minimum	:	815
	-- Maximum	:	1090
	Mass of shaft, kg	:	16.00
	Provision for locking	:	Spring loaded locking pins on both sides are provided and shear bolt also provided.

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8.3.1 Propeller shaft hub dimensions ( Ref. Fig.3 )			
Notation	As per IS:4931-1996 (mm)	As observed (mm)	Remarks
D $\phi$	34.93 $\pm$ 0.03	35.4	<b>Does not Conform</b>
d $\phi$	29.7 $\pm$ 0.1	29.76	Conforms
W	8.69 (min)	8.84	Conforms
B	54 (min)	57.8	Conforms
<b>The Dimensions of Propeller shaft hub Does not Conform as per IS:4931-1996 (mm)</b>			

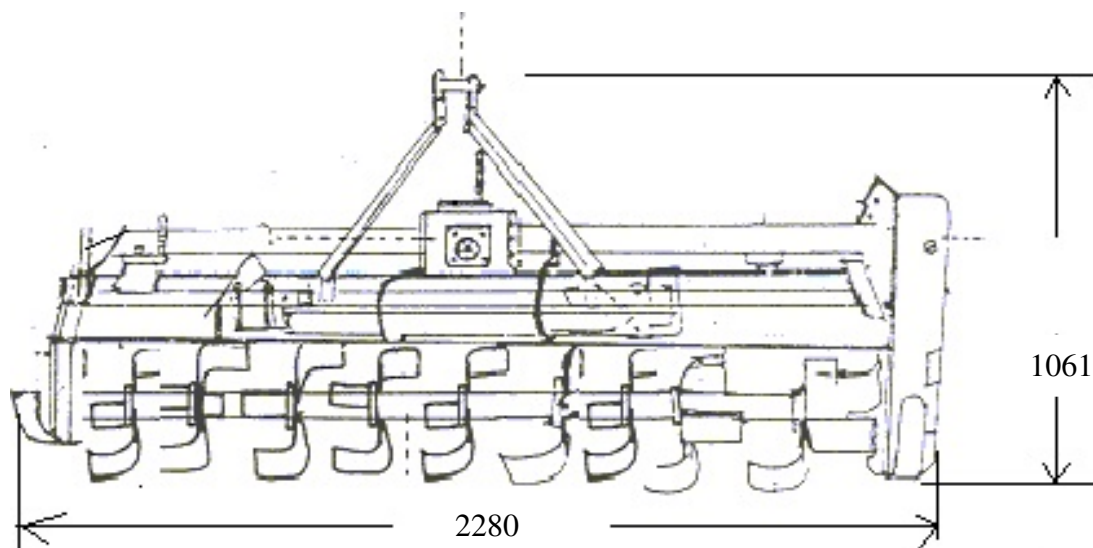
4.8.4	Safety clutch/device	:	Not Provided
4.9	Rotavator Stand	:	Provided
4.10	Furrow wheel	:	Provided



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

4.11 Overall Dimensions, mm (Ref. Fig.4)			
	Length	:	1230
	Width	:	2280
	Height	:	1061
	Weight, Kg (apa)	:	550

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**Fig. 4: Overall Dimensions of Rotavator, mm**

## 5. LABORATORY TEST

**5.1** The hardness of blades was determined at Blade portion. The results of hardness test are tabulated in Table-I.

**TABLE-1**

S.no	Portion of blade	Hardness (HRC)		Remark
		As observed	As per IS:6690-1996	
1-	On Blade Portion	46.47	37-45	Does not Conform

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	0.30	Does not Conform
2.	Silicon (Si)	1.50 to 2.0	0.22	Does not Conform
3.	Manganese (Mn)	0.50 to 1.0	1.24	Does not Conform
4.	Sulphur (S)	0.05 (max.)	0.024	Conforms
5.	Phosphorous (P)	0.05 (max.)	0.030	Conforms

**The chemical composition of blades Does not Conforms As per IS:6690-1996**

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## 6 FIELD PERFORMANCE TEST

The field tests of the implement comprising of dry and wet land operation were conducted for 34.8 hours 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	Massey ferguson 7250	
ii	Type of soil	Sandy Loam	
iii	Av. Soil moisture, %	18.75 to 20.0	-----
iv	Av. Depth of standing water, cm	-----	9.67 to 10.5
v	Puddling Index, %	----	75.0 to 85.0
vi	Av. Speed of operation, kmph	3.91 to 4.09	3.64 to 3.86
vii	Field efficiency, %	66.63 to 70.00	----
viii	Av. Depth of cut/depth of puddle, cm	10.13 to 11.27	10.63 to 11.23
ix	Av. Working width, m	2.39 to 2.42	---
x	Area covered, ha/h	0.649 to 0.672	----
xi	Time required for one hectare, h	1.49 to 1.54	-----
xii	Fuel consumption		
	- l/h	4.200 to 4.300	4.250 to 4.300
	- l/ha	6.407 to 6.468	----

### 6.1 Rate of Work

#### 6.1.1 Dry Land Operation

-The rate of work in sandy loam soil was recorded as 0.649 to 0.672 ha/h and the forward speed as 3.91 to 4.09 kmph.

-The time required to cover one hectare area was recorded as 1.49 to 1.54 h.

#### 6.1.2 Wet Land Operation

-Speed of operation varied from 3.64 to 3.86 kmph.

### 6.2 Quality of Work

#### 6.2.1 Dry land operation

-The depth of operation was recorded as 10.13 to 11.27 cm.

-The field efficiency was recorded as 66.63 to 70.00 %.

#### 6.2.2 Wet Land Operation

-Depth of puddle was recorded as 10.63 to 11.23 cm.

-Puddling index was recorded as 75.0 to 85.0 %

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### 6.3 WEAR OF BLADES

#### 6.3.1 On Mass basis

Wear of hatchet blades on mass basis after 34.8 hrs. of field operation are tabulated in Table-4.

**TABLE-4**

Sl.No	Initial mass of blade (g)	Mass after 34.8 h of operation	Loss in mass		Wear / h
			g	%	
1.	975	950	25	2.56	0.07
2.	985	955	30	3.04	0.08
3.	1010	990	30	1.98	0.05
4.	1000	975	25	2.5	0.07
5.	990	955	35	3.53	0.10
6.	995	622	40	4.02	0.11
7.	1000	965	35	3.5	0.10
8.	980	960	20	2.04	0.05

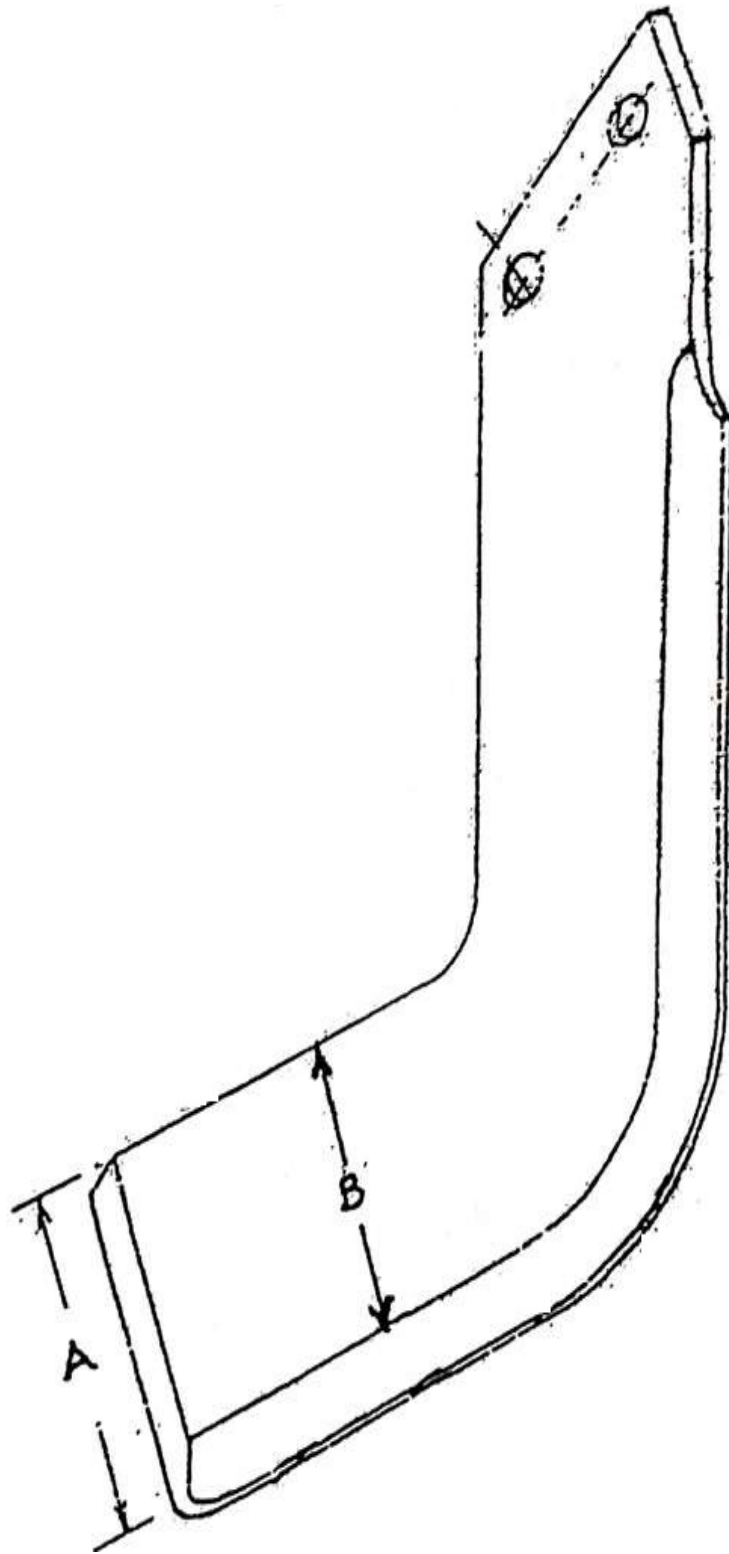
**Remark: The percentage of wear on mass basic was observed as 1.98 to 4.02 %.**

#### 6.3.2 Wear On Dimensions basis Fig. 5: (L-Type hatched Blade)

Sl.No.	Initial Width at, mm		Width after 34.8 hrs. at, mm		Wear, (mm)		Wear, %	
	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.	81.98	86.20	78.80	83.90	3.18	2.30	3.84	2.68
2.	83.10	85.46	80.80	83.56	2.30	1.90	2.84	2.25
3.	85.79	87.11	81.64	84.31	4.15	2.80	5.06	3.29
4.	84.40	87.16	81.50	85.56	2.90	1.60	3.56	1.88
5.	83.40	86.40	80.00	84.45	3.40	1.95	4.18	2.31
6.	83.34	85.51	80.74	83.96	2.60	1.55	3.15	1.81
7.	84.65	86.56	80.50	83.46	4.15	3.10	4.96	3.57
8.	83.00	85.06	80.70	83.36	2.30	1.70	2.81	1.98

**Remark: The wear percentage of blade on dimension basis in wet & dry land opreated was recorded as 2.81 to 5.06 at tip 1.88 to 3.57 at 65mm from edge respectively.**

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**Fig. 5: Dimensions for Wear Analysis (L-Type hatched Blade)**

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## **7. EFFECTIVENESS OF SEALINGS**

After completion of field test in wet land operation for 13.9 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.

<b>Sl.No.</b>	<b>Location</b>	<b>Whether ingress of mud and/or water was observed</b>
1.	Primary reduction gear box.	Not Notice
2.	Secondary reduction gear; drive	Not Notice
3.	Hub of rotor assembly	Not Notice

## **8. EASE OF OPERATION, ADJUSTMENTS & SAFETY**

- 8.1 The propeller shaft has telescopic sections with universals joints, to adjust the length of drive shaft which is adequate.
- 8.2 Depth adjustment can be made by raising or lowering the skids.

## **9. DEFECTS, BREAKDOWNS AND REPAIRS**

- 9.1 No breakdown occurred during 34.8 h operation in the field.

## **10. COMMENTS & RECOMMENDATIONS**

- 10.1 The dimensions of three point linkage system are not conforming to the requirement of As per IS:4468-2007 (pt.- I) (mm) the standard three point linkage system conforming to BIS should be used at regular production level.
- 10.2 Maneuverability of tractor with Rotavator was found to be satisfactory. The quality of work was observed to be satisfactory.
- 10.3 The percentage wear of hatchet blades on mass basis during field operation (34.8 hr) ranged from 0.05 to 0.11 %, which is normal.
- 10.4 The percentage wear of hatchet blades on dimensional basis during field operation (34.8 hr) ranged from 2.81 to 5.06 % and 1.81 to 3.57 % respectively at Tip and at 65 mm from edge.
- 10.5 Dimensions of power input & corresponding propeller shaft hub have not been provided as per requirements of As per IS:4931-1996 (mm) from the standardization point of view and interchangeability of components provision of input and propeller shaft as per the standard specification is necessary. It may be corrected at the production level before the commencing sale of the rotavators.
- 10.6 The chemical composition of blades Carbon, Silicon, Manganese does not meet As per IS:6690-1996. The standard chemical composition of blades should be used at regular production level.
- 10.7 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.



**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. APPLICANTS'S COMMENTS:**

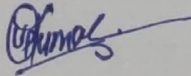
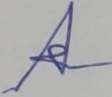

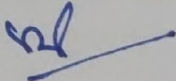
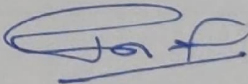
1- We will improve our dimensions of three point linkage system of Rotavator as per the requirement of IS:4468-2007 (pt,-I) (mm).

2- We will improve the dimensions of power unit and corresponding propeller shaft hub of Rotavator as per the requirement of IS: 4931-1996 (mm)

3- And also we will improve the chemical composition of blades, carbon, silicon ,Manganese as per the requirement of IS: 6690-1996.

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 26.09.2022 TO 25.09.2029**

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**ANNEXUR- 1**

**BRIEF SPECIFICATIONS OF THE TRACTOR USED DURING FIELD TEST**

1	Make, model and type	Massy Ferguson 7250 Agriculture tractor
2	Number of cylinders	03
3	Maximum PTO power, Kw	39.0
4	Power at standard Power Take-Off speed, 540± 10 rpm, Kw	35.3
5	Rated engine speed, rpm	2100
6	No load engine speed during field test, rpm	1800
7	Drawbar power, Kw	37.3
8	<b>Drawbar pull, kN :</b>	
	- Without ballast	22.93
	- With ballast	17.70
9	Type of wheel equipment	Pneumatic
10	<b>Number &amp; size of tyre :</b>	
	Front	02; 7.50-16-8PR
	Rear	02; 16.9-28-12PR
11	<b>Standard track width, mm :</b>	
	- Front	1315
	- Rear	1420
12	Wheel base, mm	2050
13	Ballast condition	un -ballast
14	<b>Total Operational Mass, kg :</b>	
	- Front	680
	- Rear	1150
	- Total	1830

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**ANNEXURE- II**

**OBSERVATION SHEET OF FIELD TESTING (DRY LAND OPERATION)**

Type of soil : Sandy loam  
Place of test : Institute farm  
Tractor used : Massey Ferguson 7250  
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.	24-11-2021	5.0	141	18.75	4.00	3.63	10.6	2.41	0.649	67.32	1.54	4.200	6.468
2.	25-11-2021	5.0	88	19.5	4.09	3.4	10.3	2.39	0.651	66.63	1.53	4.200	6.426
3.	26-11-2021	6.45	105	20.0	4.03	3.87	10.13	2.40	0.672	69.49	1.49	4.300	6.407
4.	27-11-2021	4.45	125	19.5	3.91	6.37	11.27	2.42	0.662	70.00	1.51	4.250	6.417

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**ANNEXURE-III**

**OBSERVATION SHEET OF FIELD TESTING (PUDDLING OPERATION)**

Type of soil : Sandy loam  
Place of test : Institute farm  
Tractor used : Massey Ferguson 7250  
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.	29-11-2021	5.5	9.67	85.0	10.63	3.86	5.0	4.300	1800	1900
2.	30-11-2021	6.4	9.93	80.0	10.8	3.81	4.83	4.300	1800	1900
3.	01-12-2021	2.0	10.5	75.0	11.23	3.64	5.33	4.250	1800	1900

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**ANNEXURE –IV**

**SYMBOL AND ABBREVIATIONS**

**SYMBOLS:**

<b>I- SYMBOLS ASSIGNED TO BASIC SI UNITS</b>			
<b>S.N.</b>	<b>PHYSICAL QUANTITY</b>	<b>NAME OF SI UNIT</b>	<b>SYMBOL</b>
1	Length	Meter	m
		Millimeter	mm
2	Mass	Kilogram	kg
		Gram	g
		Tone	t
3	Time	Second	s

<b>II- SYMBOLS ASSIGNED TO SOME DERIVED UNITS</b>			
<b>S.N.</b>	<b>PHYSICAL QUANTITY</b>	<b>NAME OF SI UNIT</b>	<b>SYMBOL</b>
1.	Area	Square centimeter	cm <sup>2</sup>
		Square meter	m <sup>2</sup>
		Hectare	ha
2	Speed/Velocity	Meter per second	m/s
		Kilometer per hour	kmph
3	Pressure	Newton per square millimeter	N/mm <sup>2</sup>
4	Time	Minute	min
		Hour	h
5	Volume	Cubic centimeter	cm <sup>3</sup>
		Milliliter	ml
		Liter	l
6	Minimum	Min	mi
7	Maximum	Max	ma

**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