

COMMERCIAL TEST REPORT

**REPORT NO.: IMP-2011/352
MONTH: MARCH 2022**



**MULTI-CROP SEED CUM FERTILIZER ZERO TILL PLANTER/DSR
(ROHIT-11 TYNE)**

TESTED AT

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

Telephone: 0522- 2841021

E-mail: sametiup@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 02.03.2022 TO 01.03.2029

TEST REPORT NO.	NAME OF THE MACHINE/IMPLEMENT, MODEL NO.	MONTH	YEAR
IMP-2011/352	MULTI-CROP SEED CUM FERTILIZER ZERO TILL PLANTER/DSR (ROHIT-11 TYNE)	MARCH	2022



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Type of test	:	COMMERCIAL
Name of machine	:	MULTI-CROP SEED CUM FERTILIZER ZERO TILL PLANTER/DSR (ROHIT-11 TYNE)
Test Code referred	:	IS: 6316- Dec. 2004 (Reaffirmed): Test Code for Seed cum Fertilizer Drills, IS: 6813-2000: Sowing Equipment Seed cum Fertilizer Drill-Specification, IS: 4468-March 2007 (Pt.-1): Agricultural Wheeled Tractors-Rear Mounted Three Point Linkage.
Test requested by	:	M/S ROHIT KRISHI INDUSTRIES PVT. LTD. D1 BLOCK, AKURDI CHOWK, MIDC CHINCHWAD, PUNE-411019
Testing Authority	:	STATE LEVEL FARM MACHINERY TRAINING AND TESTING INSTITUTE, RAHMANKHERA, HARDOI ROAD, LUCKNOW, U.P. - 226101
Period of test	:	AUGUST 2021 TO MARCH 2022

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.

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 followings:-

- 1.1 Specifications of the direct sowing of rice Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR;
- 1.2 Laboratory tests to find out;
 - Uniformity in seed and fertilizer metering at the specified seed rate setting for Paddy, Soybean including maximum setting.
 - Variation in seed and fertilizer rate due to different depths of seed and fertilizer in seed and fertiliser boxes.
 - To assess the percentage of seed damage in metering system .
 - Variation in seed rate due to change in speed.
- 1.3 Field tests to evaluate the suitability of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR for sowing Paddy, Soyabean with regard to:-
 - i) Quality of work
 - ii) Rate of work
 - iii) Labour requirement
 - iv) Power requirement
 - v) Ease of operation and adjustments

2. TEST PROCEDURE

No Indian standard/test code is available for testing of tractor operated rice Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR. The test procedure was therefore evolved by the institute. The guideline, however, has been taken from the following test codes.

- i) IS: 6316-1999: Test code for Seed cum fertilizer drills
- ii) IS: 6813-2000: Sowing equipment seed cum fertilizer drill-specification
- iii) IS :4468-2007: Agricultural wheeled tractors-Rear mounted three point linkage.

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. RIPL-215527822, RIPL-215527922, RIPL-215527022, RIPL-215527122, RIPL-215527222 were available and sr.no. RIPL-215527822 was selected for testing.

4. SPECIFICATIONS

4.1	GENERAL		
	Name	:	Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR (Rohit-11 Tyne)
	Name & address of manufacturer/applicant	:	M/s Rohit Krishi Industries Pvt. Ltd. D1 Block, Akurdi Chowk, MIDC Chinchwad, Pune-411019 Maharashtra state (Indian)
	Type	:	Tractor Mounted Type.
	Make	:	Rohit Krishi Industries Pvt. Ltd.
	Serial No.	:	RIPL-215527822
	Model	:	Rohit Krishi-11 Tyne.
	Nominal width, mm	:	2280
	Year of manufacture	:	2020-21
	Different seed which the drill is designed to sow (apa)	:	Paddy, Soyabean, Multicrop.
	Source of power	:	Tractor

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	Recommended travelling speed of the drill, kmph	:	Not specified. However, during test it was observed as 3.20 to 3.35.
	Recommended power of tractor	:	45 HP & above
	Location of fertilizer outlet in relation to seed outlet	:	48 mm ahead of seed outlet in the same row.
4.2	CONSTRUCTIONAL DETAILS		
4.2.1	Furrow Openers		
	Type	:	Inverted "T" Type
	No. of openers	:	11
	Arrangement of openers	:	5 at Front & 6 at Rear
	Range of selection of openers	:	0 to 80
	Method of changing row space and range	:	By changing the stepless spacing of tynes on the tool bar by (U) clamp bolt.
	Lifting and lowering of openers	:	By hydraulic system (three point linkage) of tractor
	Depth control	:	Two depth wheel are provided.
	Fertilizer placement with respect to seed	:	48 mm ahead of seed outlet in the same row.
4.2.2	Metering Mechanism		
	A- Seed Metering Device		
	Type	:	Inclined seed plate.
	Size of feed shaft, mm	:	
	Length	:	2605
	Dia	:	19.5
	Size and number of Inlined Seed Plate	:	
	Dia, mm	:	136.13 (Soybean) & 128.68 (Paddy)
	No.	:	11
	Source of power	:	By lugged Ground wheel through chain & sprocket.
	Transmission ratio of shaft of seed metering device to land wheel axle	:	1:1
	Type of agitator	:	Not applicable.
	Method of feed rate control for different sizes of seed	:	By varying the length of the flutes with respect to seed outlet of hopper through adjusting Sliding plate provided..
	Provision for closing seed discharge	:	M.S Sliding plate Provided.
	Detail of seed metering device.	:	Inclined Seed Plate 30 slot (Soybean) and 18 slot for (Paddy)
	B-Fertilizer distributor		
	Type	:	Cell type
	Size of feed shaft, mm	:	
	Length	:	2645
	Dia	:	15.70
	Size and number of rollers	:	
	Dia, mm	:	82
	No.	:	9

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	No. of cells in each rollers	:	09
	Outer dia of rollers, each		82
	No. of fertilizer feed chamber		11
	No. of rollers in each chamber		01
	Type of agitator	:	Not applicable
	Method of feed rate control	:	By varying the length of the flutes with respect to seed outlet of hopper through adjusting Sliding plate provided.
	Provision for closing fertilizer discharge	:	Plastic sliding plates are provided.
	Tranmission ratio of shaft of fertilizer metering device to land wheel axle		1:1
4.2.3	Hopper		
	Capacity, (Kg)		30.0 (Paddy) to 40.0 (Soybean)
	Seed Fertilizer		78
	Size,mm		
	Lenght	:	375
	Widht	:	2460
	Type of hoppers	:	Trapezoidal MS Sheet with Cover
4.2.4	Marker details	:	Not Provided
4.2.5	Seed covering arrangement	:	Provided
4.2.6	Type of hitch & its details		
	Type	:	Three Point Linkage
	Shape	:	Pyramid
	Material of construction	:	MS flat
	Size of flat, mm	:	(Front) 800×65×12 & 880×50×10 (Rear) Respectively.
	Length of lower link hitch pins, mm	:	115
	Height of lower link hitch pins from ground level, mm	:	460

Dimensions of Three point linkage (Refer fid. 1):-

S. No.	Component	Specifications		Remarks
		As per IS :4468-(Pt.-1) March, 2007, mm	As measured, mm	
1.	Upper hitch point			
a)	Diameter of hitch pin (A)	25.37 to 25.50	24.97	Does not conform
b)	Diameter of hitch pin hole (B)	25.70 to 25.90	28.16	Does not conform
c)	Linch pin hole distance (D)	93 (Min.)	106.47	Conforms
d)	Width between outer faces of yoke (E)	86 (Max.)	75.61	Conforms
c)	Width between inner faces of yoke (F).	52 (Min.)	52.0	Conforms
2.	Lower hitch points			
a)	Dia of hitch pin	27.79 to 28.0	27.12	Does not conform
b)	Diameter of hitch pin hole (H)	28.70 to 29.03	28.39	Does not conform

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c)	Linch pin hole distance (K)	49 (Min.)	106.65	Conforms
3.	Diameter of linch pin hole for			
a)	Upper hitch pin (L)	12 (Min.)	10.10	Does not conform
b)	Lower hitch pin (L)	12 (Min.)	10.42	Does not conform
4.	Mast height (M) (Cat-II) (M)	610 ± 1.5	605	Does not conform
5.	Lower hitch point span (N)	823.5 to 826.5	870	Does not conform

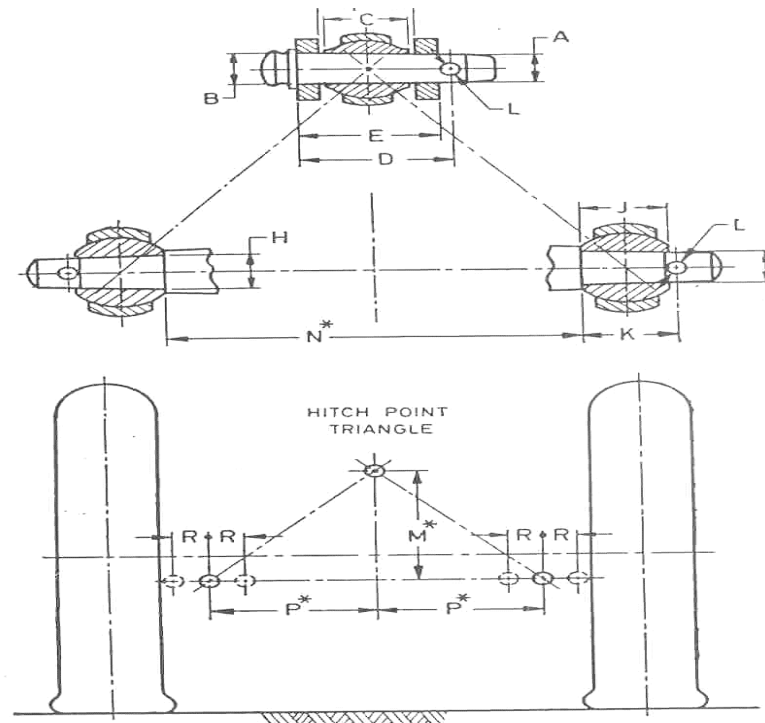


Fig. No 1 Dimension of Hitch Points

4.2.7	Ground drive		
	No. of wheels	:	One
	Type of wheel	:	Lugged M.S. construction
	Outer dia of wheel, mm	:	460 with Lugged & 280 Rim.
	Method of transmitting power to feed shaft	:	Through chain and sprocket
4.2.8	Details of depth adjustments	:	By two depth gauge wheels
4.2.9	Safety arrangement for rotating parts	:	Chain cover provided
4.2.10	Metering unit controls		
4.2.10.1	a-seed metering controls		
	Type	:	M.S Sliding. Plate (Range 0-60 mm)
	Maximum angle	:	45
	No. of angles possible	:	One
	Method of changing angle	:	Fixed.

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4.2.10.1	b-fertilizer metering controls		
	Type	:	Plastic Sliding. Plate (Range 0-30 mm)
	Maximum angle		20
	No. of angles possible	:	One
	Method of changing angle		Fixed.
4.2.11	Overall Dimensions, mm		
	Length	:	1480
	Width		2720
	Height		1137
4.2.11.1	Mass, Kg		370 kg (apa)
4.2.12.2	No. of greasing/oiling points	:	Greasing- 21 Oiling- 06

5. CONFORMITY WITH BIS REQUIREMENTS

Cl. 6.0 IS 6813-2000 Material of construction of different component

Sl. No.	Component	Material specified in IS	Observations	Remarks
1.	2.	3.	4.	5.
1.	Frame & tool bar	Mild steel	Mild steel	Conforms
2.	Axle & Shaft	Mild steel	Mild steel	Conforms
3.	Seed & fertilizer boxes	Mild steel, Galvanised iron sheet, Seasoned wood , Plastic, fibre reinforced plastic	Mild steel	Conforms
4.	Tines	Mild steel, Carbon steel	Mild steel	Conforms
5.	Boot	Mild steel, Cast iron	Mild steel	Conforms
6.	Wheel	Mild steel, Cast iron, Pneumatic tyre	Mild steel	Conforms
7.	Seed agitator	Mild steel, Cast iron, Aluminium, PVC, Rubber, Canvas	N.A	-
8.	Furrow opener	High carbon steel	High Carbon Steel	Conforms
9.	Fertilizer agitator	Mild steel, Cast iron, Aluminium, Canvas	N.A	-
10.	Seed & Fertilizer tubes	Steel ribbon, Plastic, Rubber	Plastic	Conforms

Clause No.	Description	Observations	Remarks
1	2	3	4
Cl.7 HARDNESS	The furrow openers shall be hardened to have brinell hardness between 350 to 450 HB when tested in accordance with IS: 1500-1983.	Hardness of furrow opener is 360 to 410 HB.	Conforms

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Cl. 8 CONSTRUCTIONAL REQUIREMENTS			
Cl. 8.1 Frame and Tool bar	These should be rigid and strong. The tool bar should have 12.5mm diameter holes after every 50mm throughout its length, if it has to be attached through nuts and bolts	Frame is rigid & strong enough and made of M.S. box of size 65×65 Tynes are U clamped with bolt & nut to the tool bar, for stepless row spacing of seed & fertilizer.	Conforms
Cl.8.2 Wheels	Wheels should have either bushes or dust proof bearings. They should be strong and shall be provided with lugs/ pegs. Wheels should be so attached that they can be easily lowered or raised	Wheels have ball bearing (bearing no. F205) and provided with lugs and raising & lowering arrangement.	Conforms
Cl.8.3 Axles and Shafts	Axles and shafts should be so attached that they can be removed for cleaning when desired	Provisions for removing the axle & shaft for cleaning is made available.	Conforms
Cl.8.4 Seed and Fertilizer Boxes	a- These should be either separate or one continuous box with a partition.	Separate boxes are provided for seed and fertilizer.	Conforms
	b) The boxes should have adequate capacity and may be trapezoidal or cylindrical with or without tapered bottom.	The capacity of seed and fertilizer box is 30 kg (Paddy), 40 kg (Soybean) & 78 kg respectively which is adequate. The shape of seed and fertilizer box is trapezoidal with tapered bottom	Conforms
	c) The boxes should be adequately covered to avoid entrance of water	Covers are provided	Conforms
	d) The boxes should be sufficiently strong and should not buckle when fully filled with seed and fertilizer	No buckling of the boxes was noticed when filled with seed & fertilizer to its full capacity	Conforms
	e) The boxes should be provided with self locking mechanism on being opened	Loking Mechanism is provided But self locking not provided.	Does not conform
Cl.8.4.1	The thickness of mild steel and galvanized steel sheet for boxes shall be not less than 1.0 mm and 0.63mm respectively.	M.S.sheet of 2.0 mm thickness is provided	Conforms
Cl.8.5 Tines	Tines should be properly attached with tool bar either by bolts and nuts or with clamps	Tines are attached with (U) clamps.	Conforms

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Cl.8.6 Furrow Openers	Furrow openers of shovel shoe or disc type shall conform to the requirements as given in IS: 6813-2000 separately.	Furrow openers of inverted 'T' Type are provided, which are not covered under relevant code .	Does not conform
Cl 8.7.1 Seed & Fertilizer tubes	Tubes should be made of transparent plastics Thickness of plastic tubes shall be of 2.5 mm (Min.)	Thickness of transparent plastic tube of seed and fertilizer is 2.0 and 2.0 mm respectively.	Does not conform
Cl. 9 Performance Requirements			
Cl.9.1	The variation in dropping of seed and fertilizer in different feeding outlets separately shall be not more than 7 and 12.5 percent respectively from the average quantity obtained	The variation in dropping of seed and fertilizer in different feeding outlets separately was observed from 0.78 to 1.37 paddy 0.78 to 1.39 soybean and 0.77 to 1.40 D.A.P respectively.	Conforms
Cl.9.2	The variation in quantity dropped per hectare and quantity specified to be dropped at a particular setting shall be not more than 7 and 12.5 percent for seed and fertilizer respectively	Quantity of dropping of seed and fertilizer at particular settings are specified by applicant be not more than 0.79 to 1.33 (Paddy) 0.75 to 1.50 (Soybean) percent for seed and fertilizer respectively.	Conforms
Cl.9.3	The seed and fertilizer rate shall be easily adjustable upto 125Kg and 1000 Kg per hectare respectively.	Required adjustment is provided for fertilizer only	Partially Conforms
Cl.9.4	The percentage of visible damage to seed in the drill shall not exceed 0.5 percent	The Percentage of mechanical damage to seed in the drill was observed from 0.73 to 1.57 (Paddy) & 0.90 and 2.75 (Soybean) percent.	Does not conform
Cl. 9.5 For Seed Only	The variation in dropping due to box filling at $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of rated capacity shall not exceed 10 percent	The variation in dropping due to box filling at $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of rated capacity of seed & fertilizer, observed from 1.70 to 2.43, 1.70 to 2.43, 1.42 to 3.36 (Soybean), 1.68 to 2.46, 1.65 to 2.54, 1.67 to 2.50 (Paddy) and 1.81 to 2.23, 1.87 to 2.15, 1.74 to 2.36, 1.76 to 2.36	Conforms

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		(D.A.P) for seed & fertilizer respectively.	
Cl.9.7	The variation in quantity of seed per meter of row length shall not exceed by 10 percent	The variation in quantity of seed per meter of row length was observed from 0.79 to 1.33 (Paddy) & 0.75 to 1.50 (Soybean) percent.	Conforms
Cl. 9.8	a) The drill shall be able to sow seed upto 100 mm deep	The drill was able to sow seed upto 100 mm depth	Conforms
	b) The drill shall be able to drop fertilizer at a minimum of 25 mm to the side of the seed	Dropping of fertilizer is 48 mm ahead of seed in same row.	Conforms
Cl. 9.11	The drill shall be able to sow wheat and one or more of the following: a) Barley b) Paddy, c)Millet, d) Pea e) Bengal gram, Soyabean & pigeon pea The drill shall also be able to sow all types of granular fertilizers.	Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR is tested to sowing of paddy and soybean seed only used with DAP	Conforms
Cl. 10 Other requirements			
10.1	Row spacing shall be adjustable ranging from 150 to 225 mm preferably in steps of 25 mm	Stepless spacing 80 mm is adjustable through U bolt clamp.	Does not conform
10.2	When the furrow openers are lowered to plain surface ,openers shall not deviate by more than 5 mm from the line of alignment vertically and horizontally	Deflection was observed within prescribed limit.	Conforms
10.3	The weight of tractor-mounted drill including the weight of seed and fertilizer filled at rated capacity of box shall not exceed 300 N/kW drawbar power of the tractor recommended for the drill	The weight of tractor-mounted drill including the weight of seed and fertilizer filled at rated capacity of boxes is 181.6 N/kw of drawbar power of tractor.	Conforms
10.4	A permanent type metallic calibration plate indicating the position and quantity of seed & Fertilizer should be attached under the top cover of seed box.	Provided	Conforms
10.5	In case of all the trailed drills and mounted drills having plate type mechanism arrangement for quick cut-off of the seed & Fertilizer when the drill is	The drill have plate type mechanism for quick cutt- off of the seed &fertilizer respectively.	Conforms

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	moving should be provided. This arrangement should be without disturbing the setting of metering mechanism.		
10.6	Lubrication arrangement should be provided for all moving components except the portions exposed to seed & fertilizer.	Required arrangement is provided	Conforms
10.7	For tractor operated drills the system of hitching should be designed to suit the three point linkage and drawbar of agricultural tractors.	Three point linkage hitching system is provided	Conforms
10.8	Each drill should be provided with instruction sheets containing full information on method of operation and of drill.	Instruction sheet is not provided	Does not conform
10.8.1	Each drill shall also be supplied with necessary tools.	Tools are supplied with seed drill	Conforms
10.8.2	Provision should be made for easy removal of seed and fertilizer from the hopper after the days work.	Provision is made for easy removal of seed & fertilizer from the hopper after the days work.	Conforms
10.8.3	Each drill should be provided with a manual containing maintenance and storage instruction, calibration chart etc.	A manual in shape of booklet is provided wherein, calibration chart, storage instructions have been covered.	Conforms
Cl. 11 Accessories			
	The following accessories may be provided with each drill:- a) Foot board b) Covering device c) Row marker; d) Area Marker e) Covering device	Only B is provided but is not as per IS	Does not conform
Cl.12 Workmanship and Finish			
Cl. 12.1	The welding shall be satisfactory in all respect and should not be brittle or porous	The welding is satisfactory in all respect.	Conforms
Cl.12.2	The components shall be free from rust and shall have protective coating to prevent surface deterioration in transit and storage	The components are free from rust and have protective coating to prevent surface	Conforms

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		deterioration in transit and storage	
Cl.12.3	The components should be free from pits, burrs and other defects that may be detrimental for their use	The components are free from pits, burrs and other defects that may be detrimental for their use	Conforms
Cl. 14.1	Each drill shall be marked with the following particulars:- a) Indication of the source of Manufacturer b) Model,Code and serial number c) Type and size d) type of seed (suitability) e) mass	Only A, B Provided but is not as per IS.	Does not conform

6. RUNNING-IN

The Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR was run-in for 1.0 h. Bolts and nuts were tightened and lubrication were done before start of the actual test .

7. LABORATORY TEST

A. Seed specifications:

Variety	Bulk density , gm/cc	No. of seeds in one Kg. Sample	Moisture content, %	Broken , %
PHULE SANGAM (Soybean)	0.56	19350	8.6	Nil
INDRAYNI (Paddy)	0.58	27995	8.5	Nil

B. Fertilizer specifications :

Type	Bulk density, g/cc
DAP	0.945

C. Wear of soil engaging component:

The test sample was operated for 25.0 h. Wear of soil engaging components (furrow openers) is given in Table-1.

TABLE-1

Furrow opener	Mass of furrow opener before test, (g.)	Mass of furrow opener after test, (g.)	Loss in mass, (g.)	Wear, %
1	7000	6960	40	0.57
2	7060	7010	50	0.70
3	7090	7030	60	0.84
4	7045	7000	45	0.63
5	7050	7000	50	0.70
6	7080	7010	70	0.98

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5.2	Chemical composition of Tyne portion			
	The chemical composition of Tyne 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	0.29	Does not conforms
2.	Silicon (Si)	1.50 to 2.0	0.17	Does not conforms
3.	Manganese (Mn)	0.50 to 1.0	0.55	Conforms
4.	Sulphur (S)	0.05 (max.)	0.034	Conforms
5.	Phosphorous (P)	0.05 (max.)	0.064	Conforms

8. FIELD TEST

Field test of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR was conducted at Pune (Maharashtra) for 25 h consisting of 03 trials. The implement was used for sowing paddy (Indrayani) soybean (Phule sangam) in un-ploughed field. The detailed test results are given in Annexure-IV and are summarised as under:-

Summary of field test results:

Sl. No.	Parameters	Range of measurement
1.	Av. Depth of seed sowing, cm	6.82 to 6.83
2.	Av. Depth of fertilizer placement, cm	7.50 to 7.67
3.	Av. Width of sowing, m	2.05 to 2.06
4.	Av. Forward speed, kmph	2.89 to 2.93
5.	Av. Draft, Kgf	355 to 385
6.	Field capacity, ha/h	0.500 to 0.552
7.	Field efficiency, %	82.92 to 93.24
8.	Seed rate, Kg/ha	1.57 to 209.90 (Soybean), 73.00 to 97.50 (Paddy)
9.	Fertilizer rate, Kg/ha	269.50 to 312.00 (D.A.P)
10.	Fuel consumption, l/h	3.600 to 4.200 (7.128 to 8.400)
11.	Time required for 1 hac area covered (h)	1.81 to 2.00

8.1 Quality of work:

The average depth of seed and fertilizer placement was observed as 6.82 to 6.83 and 7.50 to 7.67 cm. Application rate for seed and fertilizer were found 1.57 to 209.90 (Soybean), 73.00 to 97.50 (Paddy) & 269.50 to 312.00 (D.A.P) kg/ha respectively.

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8.2 Rate of Work & Fuel consumption :

The average width of sowing was observed as 2.05 to 2.06 m. The area covered was 0.500 to 0.552 ha/h and fuel consumption varied from 3.600 to 4.200 l/h & 7.128 to 8.400 (l/ha)

8.3 Field efficiency and labour requirement:

Field efficiency of machine was observed as 82.92 to 93.24 % .

Two labours are required to operate the drill. Out of two one skilled labour is required for adjustments & calibrate the seed drill and to operate the tractor and other unskilled to load the seed and fertilizer boxes, cleaning of furrow openers etc, during the operation.

8.4 Wear of soil engaging component:

The wear of furrow openers varied from 0.57 to 0.98 % by mass basis which is within permissible limit.

9.0 LUBRICATION & SERVICING

All lubrication points were lubricated/greased daily before start of the operation.

10. EASE OF OPERATION AND ADJUSTMENT

Operation and adjustment of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR was observed to be satisfactory.

However, the driver has to get down from the tractor to do the adjustments on Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR.

11. SOUNDNESS OF CONSTRUCTION

No breakdown was observed during 25.0h of operation of seed drill.

12. COMMENTS AND RECOMMENDATIONS

- i) The dimensions of seed metering mechanism do not conform to the requirement of IS: 6813-2000. Metering mechanism comply with IS requirements should be used at regular production level.
- ii) Dimension of three point linkage do not conform fully to the requirements of IS:4468-March 2007. Suitable improvement should be done at production level, to comply with BIS requirements.
- iii) Wear of furrow openers was found normal.
- iv) Furrow openers types of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR are not as per requirement IS: 6813-2000
- v) 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.

13. LITERATURE:

The manufacturer has developed the literature of machine in a single booklet wherein calibration chart, off season storage technique are not there. Therefore, the manufacturer should develop literature in Hindi or English & other regional languages. As per IS: 8132-1983 for the guidance of users & technical personnel.

14. APPLICANT'S COMMENTS:




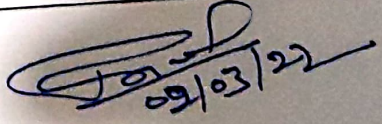
The dimensions of seed metering mechanism will be improved in future production as per IS: 6813-2000.

Dimension of three-point linkage will be improved in future production as per Indian Standard.

Type of furrow opener of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR will be improved in future production level as per IS: 6813-2000.

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-	
(JIWAN PRAKASH) -ASSOCIATE PROFESSOR - ENGG.	
(DR. PANKAJ TRIPATHI) - DIRECTOR-	 09/03/22

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ANNEXURE-1

BRIEF SPECIFICATIONS OF THE TRACTOR USED DURING FIELD TEST

1	Make, model and type	Swaraj-855
2	Number of cylinders	3
3	Maximum PTO power, Kw	36.3
4	Power at standard Power Take-Off speed, 540± 10 rpm, Kw	32.0
5	Rated engine speed, rpm	2200
6	No load engine speed during field test, rpm	1800
7	Drawbar power, Kw	37.3
8	Drawbar pull, kN :	
	- Without ballast	16.33
	- With ballast	21.1
9	Type of wheel equipment	Pneumatic
10	Number & size of tyre :	
	Front	Two, 7.50- 16PR
	Rear	Two, 16.9- 28PR
11	Standard track width, mm :	
	- Front	1350-1750
	- Rear	1465-1875
12	Wheel base, mm	2205
13	Ballast condition	Used as Un ballast
14	Total Operational Mass, kg :	
	- Front	905
	- Rear	1522
	- Total	2430

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ANNEXURE-II

SUMMARY OF STATIONARY CALIBRATION (SOYBEAN)

Forward speed (kmph)	Level of seed in hopper	Rate setting	Weight of Soybean from furrow openers (g)											Avg.	Seed rate (Kg/ha)	Variation from average (%)	
			1	2	3	4	5	6	7	8	9	10	11			Min	Max
3.0	Full	Max.	220	220	315	240	255	225	265	260	225	225	220	178.00	267.00	1.70	2.43
		Med.	160	150	170	220	150	230	225	204	265	170	155	139.93	209.90	1.57	2.77
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	215	215	310	235	250	220	260	255	220	220	215	174.33	261.50	1.69	2.44
		Med.	155	140	160	215	110	225	220	200	260	165	150	133.33	200.00	1.42	3.36
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	225	215	320	245	260	230	270	265	230	230	225	181.00	271.50	1.67	2.49
		Med.	160	160	150	140	155	125	165	155	125	115	120	104.67	157.00	1.70	2.43
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	210	215	220	250	240	250	245	260	270	280	200	176.00	264.00	1.71	2.40
		Med.	140	150	165	170	140	145	150	165	170	180	200	118.33	177.50	1.70	2.43
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.0	Full	Max.	345	350	345	470	340	395	405	375	350	360	340	271.67	407.50	1.72	2.38
		Med.	240	250	240	250	220	225	230	240	250	260	270	178.33	267.50	1.81	2.23
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	360	365	340	365	350	360	375	380	380	370	290	262.33	393.50	1.76	2.31
		Med.	240	250	260	265	250	265	270	280	300	290	280	196.67	295.00	1.80	2.25
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	360	380	360	365	370	380	390	360	365	370	380	272.00	408.00	1.92	2.08
		Med.	290	260	270	280	290	290	285	260	305	300	270	206.67	310.00	1.85	2.17
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	380	300	400	410	415	400	370	380	370	370	360	277.00	415.50	1.72	2.38
		Med.	280	290	265	270	280	290	290	290	245	250	260	200.67	301.00	1.84	2.18
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ANNEXURE-III

SUMMARY OF STATIONARY CALIBRATION (PADDY)

Forward speed (kmph)	Level of seed in hopper	Rate setting	Weight of Paddy from furrow openers (g)											Avg.	Seed rate (Kg/ha)	Variation from average (%)	
			1	2	3	4	5	6	7	8	9	10	11			Min	Max
3.0	Full	Max.	60	70	80	95	100	110	80	90	85	100	110	65.33	98.00	1.55	2.83
		Med.	40	45	50	60	70	80	65	70	75	90	85	48.67	73.00	1.44	3.25
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	90	95	100	110	105	120	95	80	100	120	110	75.00	112.50	1.67	2.50
		Med.	60	65	70	65	80	75	70	65	70	80	90	52.67	79.00	1.67	2.50
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	110	120	130	140	145	105	110	105	90	100	120	85.00	127.50	1.62	2.61
		Med.	90	95	100	100	95	80	80	100	75	65	95	65.00	97.50	1.65	2.54
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	110	105	105	95	100	110	120	130	140	100	105	81.33	122.00	1.68	2.47
		Med.	90	85	65	70	80	90	85	75	95	65	85	59.00	88.50	1.68	2.46
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.0	Full	Max.	150	160	170	165	180	175	160	140	150	100	120	111.33	167.00	1.56	2.80
		Med.	100	100	105	95	100	110	120	100	105	95	85	74.33	111.50	1.71	2.41
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	110	120	140	135	150	160	175	165	170	180	165	111.33	167.00	1.61	2.64
		Med.	90	95	85	75	100	110	105	95	75	85	95	67.33	101.00	1.68	2.47
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	120	130	125	120	140	130	170	180	175	165	140	106.33	159.50	1.67	2.50
		Med.	90	100	110	105	65	85	95	70	65	100	105	66.00	99.00	1.59	2.69
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	110	120	140	150	175	180	165	170	160	150	140	110.67	166.00	1.61	2.64
		Med.	90	95	100	195	100	195	110	120	130	100	95	88.67	133.00	1.46	3.17
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ANNEXURE-IV

SUMMARY OF STATIONARY CALIBRATION FERTILIZER (D.A.P)

Forward speed (kmph)	Level of seed in hopper	Rate setting	Weight Of Fertilizer (D.A.P) From Furrow Openers (G)											Avg.	Seed rate (Kg/ha)	Variation from average (%)	
			1	2	3	4	5	6	7	8	9	10	11			Min	Max
3.0	Full	Max.	360	385	395	315	315	355	30	350	310	350	365	235.33	353.00	1.08	14.17
		Med.	200	290	235	215	200	260	290	300	240	250	210	179.33	269.00	1.67	2.50
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	315	385	350	315	320	340	350	360	365	370	380	256.67	385.00	1.82	2.22
		Med.	300	290	260	265	270	280	290	290	340	250	280	207.67	311.50	1.74	2.36
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	320	340	345	340	365	370	390	400	410	415	390	272.33	408.50	1.77	2.30
		Med.	290	260	300	260	290	280	290	260	250	300	340	208.00	312.00	1.74	2.36
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	360	370	390	380	365	370	380	340	365	380	390	272.67	409.00	1.87	2.15
		Med.	260	265	280	290	265	270	280	265	290	300	300	204.33	306.50	1.87	2.15
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.0	Full	Max.	645	600	630	650	640	645	585	590	600	570	625	452.00	678.00	1.88	2.14
		Med.	500	600	400	600	450	420	570	520	260	475	450	349.67	524.50	1.43	3.31
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	600	650	640	665	650	675	670	670	650	600	540	467.33	701.00	1.80	2.25
		Med.	400	600	450	600	450	460	470	480	490	500	470	358.00	537.00	1.67	2.50
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	600	610	615	620	590	580	610	665	670	650	590	453.33	680.00	1.87	2.16
		Med.	400	410	400	435	520	460	470	465	470	470	465	331.00	496.50	1.77	2.30
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	690	610	620	630	630	590	580	590	530	560	570	440.00	660.00	1.77	2.30
		Med.	400	400	415	420	400	500	530	400	490	480	455	326.00	489.00	1.75	2.33
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ANNEXURE-V

SUMMARY OF MECHANICAL DAMAGE TEST (PADDY)

Forward speed (kmph)	Rate setting	Mechanical damage from furrow openers (%)											Average	Variation From Mean
		1	2	3	4	5	6	7	8	9	10	11		
3.0	Recommended rate setting for field	0.40	0.20	0.30	0.40	0.50	0.40	0.20	0.40	0.50	0.30	0.40		
		0.30	0.40	0.50	0.30	0.40	0.50	0.30	0.30	0.40	0.20	0.30		
	Average	0.35	0.30	0.40	0.35	0.45	0.45	0.25	0.35	0.45	0.25	0.35	0.35	0.77-1.4
5.0	Recommended rate setting for field	0.90	0.20	0.30	0.40	0.60	0.40	0.40	0.50	0.50	0.40	0.40		
		0.60	0.60	0.70	0.30	0.50	0.50	0.60	0.70	0.70	0.50	0.60		
	Average	0.75	0.40	0.50	0.35	0.55	0.45	0.50	0.60	0.60	0.45	0.50	0.51	0.73-1.57

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ANNEXURE-VI

SUMMARY OF UNIFORMITY TEST (PADDY)

Rate setting	Parameter	furrow openers (%)											Average	Variation From mean
		1	2	3	4	5	6	7	8	9	10	11		
Recommended rate setting for field	No. of seeds dropped per metre of row length	14	15	16	17	18	20	22	14	18	16	12		
		18	14	20	19	17	16	14	12	18	16	10		
		20	28	12	14	16	18	20	10	10	14	12		
	Average	17.33	19.00	16.00	16.66	17.00	18.00	18.66	12.00	15.33	15.33	11.33	16.05	0.79-1.33
Recommended for seed sowing	Av. distance between two seed (mm)	7	8	9	6	5	4	5	6	4	9	4		
		4	1	2	5	8	7	6	5	4	3	5		
		6	2	5	4	4	6	4	2	8	2	4		
	Average	5.66	3.66	5.33	5.000	5.66	5.66	5.00	4.33	5.33	4.66	4.33	4.96	0.82-1.27

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ANNEXURE-VII

SUMMARY OF MECHANICAL DAMAGE TEST (SOYBEAN)

Forward speed (kmph)	Rate setting	Mechanical damage from furrow openers (%)											Average	Variation From Mean
		1	2	3	4	5	6	7	8	9	10	11		
3.0	Recommended rate setting for field	0.24	0.26	0.22	0.16	0.18	0.15	0.16	0.19	0.20	0.21	0.16		
		0.18	0.14	0.16	0.20	0.16	0.20	0.18	0.16	0.22	0.20	0.18		
	Average	0.21	0.20	0.19	0.18	0.17	0.17	0.17	0.17	0.21	0.20	0.17	0.18	0.90-1.11
5.0	Recommended rate setting for field	0.50	0.60	0.70	0.80	0.90	0.60	0.50	0.60	0.50	0.40	0.60		
		0.60	0.70	0.40	0.30	0.50	0.60	0.40	0.50	0.30	0.40	0.80		
	Average	0.55	0.65	0.55	0.55	0.70	0.60	0.45	0.55	0.40	0.40	0.70	0.55	1.75 to 2.75

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ANNEXURE-VIII

SUMMARY OF UNIFORMITY TEST (SOYBEAN)

Rate setting	Parameter	furrow openers (%)											Average	Variation From mean
		1	2	3	4	5	6	7	8	9	10	11		
Recommended rate setting for field	No. of seeds dropped per metre of row length	25	27	25	28	26	24	26	30	27	24	28		
		29	25	26	26	28	26	28	32	26	22	26		
		25	30	32	30	27	28	30	28	24	26	25		
	Average	26.33	27.33	27.66	28.00	27.00	26.00	28.00	30.00	25.66	24.00	26.33	26.93	0.90-1.12
Recommended for seed sowing	Av. distance between two seed (mm)	9	3	4	3	7	6	5	2	5	4	5		
		5	6	6	5	6	4	7	3	6	5	5		
		4	5	4	6	4	2	4	4	4	6	6		
	Average	6.00	4.66	4.66	4.66	5.66	4.00	5.33	3.00	5.00	5.00	5.33	4.84	0.75-1.5

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ANNEXURE -IX

SUMMARY OF FIELD TEST (DSR)

Place of test : PUNE (MAHARASTRA)

Tractor used : Swaraj 855

Gear Used : L-1

S.No.	Test Number	1	2	3
1.	Date of test	9-11-2021	10-11-2021	11-11-2021
2.	Duration of test ,h	8.0	8.0	9.0
3.	Variety of seed	INDRAYANI (Paddy)	INDRAYANI (Paddy)	PHULE SANGAM (Soybean)
4.	Av. Forward speed ,kmph	2.93	2.89	2.93
5.	Av. Wheel slip ,%	4.33	4.67	4.33
6.	Fuel consumption ,l/h.	3.600 (7.128)	4.000 (7.240)	4.200 (8.400)
7.	Av. Depth of sowing ,cm			
	Seed	6.83	6.83	6.83
	Fertilizer	7.67	7.50	7.67
8.	Av. Width of sowing ,m	6.30	6.35	6.80
9.	Seed rate setting ,kg/ha	1.57 to 209.90 (Soybean), 73.00 to 97.50 (Paddy)		
10.	Fertilizer rate setting ,kg/ha	269.50 to 312.00 (D.A.P)		
11.	Field capacity ,ha/h	0.504	0.552	0.500
12.	Field efficiency ,%	84.00	93.24	82.92
13.	Av. Draft ,kgf	355	360	385
14.	Time reured for 1 ha area covered/h	1.98	1.81	2.00

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ANNEXURE -X

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.	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	h
5	Volume	Cubic centimeter	cm ³
		Milliliter	ml
		Liter	l
6	Maximum	Max	m
7	Minimum	Min	m

ABBREVIATIONS:

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