COMMERCIAL TEST REPORT

REPORT NO.: IMP-2011/351
MONTH: MARCH 2022

सत्यमेव जयते

MULTI-CROP SEED CUM FERTILIZER ZERO TILL PLANTER/DSR (ROHIT-9 TYNE)

TESTED AT

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

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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 VALID FROM 02.03.2022 TO 01.03.2029

TEST REPORT NO.	NAME OF THE MACHINE/IMPLEMENT, MODEL NO.	MONTH	YEAR
IMP-2011/351	MULTI-CROP SEED CUM FERTILIZER ZERO TILL PLANTER/DSR (ROHIT-9 TYNE)	MARCH	2022

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Type of test	:	COMMERCIAL
Name of machine	:	MULTI-CROP SEED CUM FERTILIZER ZERO TILL PLANTER/DSR (ROHIT-9 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

CONTENTS

1. SCOPE OF TEST

The scope of test was to check and assess the followings:-

1.1 Specifications of the direct sowing of 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 asses 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, Soyabeen 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 standered/test code is available for testing of tractor operated opreted Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR. The test procedure was therefor envolved by the insitute. The guideline,however have 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-215747122, RIPL-215747222, RIPL-215747322, RIPL-215747422, RIPL-215747522 to were available and sr.no. RIPL-215380522 was selected for testing.

4. SPECIFICATIONS

4.1	**GENERAL**		
	Name	:	Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR (Rohit-9 Tyne)
	Name & address of manufacturer/applicant	:	M/s Rohit Krishi Industries Pvt. Ltd. D1 Block, Akurdi Chowk, MIDC Chinchwad, Pune-411019 Maharashtra state (India)
	Type	:	Tractor Mounted Type.
	Make	:	Rohit Krishi Industries Pvt. Ltd.
	Serial No.	:	RIPL-215747222
	Model	:	Rohit Krishi-9 Tyne.
	Nominal width, mm	:	2050
	Year of manufacture	:	2020-21
	Different seed which the drill is designed to sow (apa)	:	Paddy, Soyabeen, Multicrop.
	Source of power	:	Tractor

	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	:	35 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	:	9
	Arrangement of openers	:	4 at Front & 5 at Rear
	Range of selection of openers mm	:	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 Dia	 : :	 2230 19.5
	Size and number of Inlined Seed Plate Dia, mm No.	 : :	 136.12 (Soybean) & 128.65 (Paddy) 9
	Source of power	:	By lugged Ground wheel through chain & sprocket.
	Tranmission 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 Dia	 : :	 2250 15.70
	Size and number of rollers Dia, mm No.	 : :	 82 9
	No. of cells in each rollers	:	09
	Outer dia of rollers, each, mm		82

	No. of fertilizer feed chamber		9
	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) Seed Fertilizer		 22.5 (Paddy) to 38 (Soybean) 78
	Size,mm Lenght Widht	 : :	 375 2060
	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**	27.29	**Does not conform**
c)	Linch pin hole distance (D)	**93 (Min.)**	106.47	Conforms
d)	Width between outer faces of yoke (E)	**86 (Max.)**	78.23	Conforms
c)	Width between inner faces of yoke (F).	**52 (Min.)**	53.43	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**	28.08	**Does not conform**
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**	610	Conforms
5.	**Lower hitch point span (N)**	**823.5 to 826.5**	870	**Does not conform**

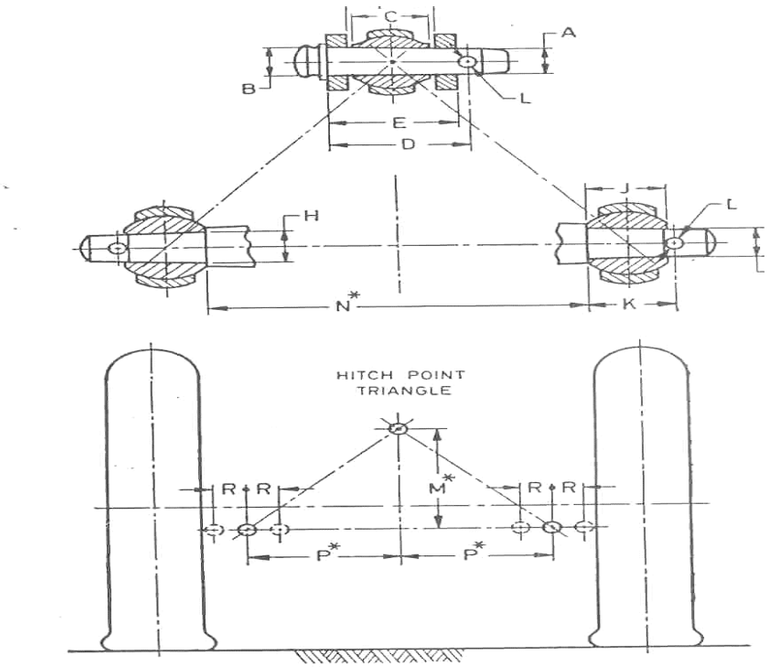

Fig. No 1 Dimension of Hitch Points

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.
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	:	2410
	Height	:	1137
4.2.11.1	Mass, Kg	:	350 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
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	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	Conforms

	through nuts and bolts	stepless row spacing of seed & fertilizer.	
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 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 22.5 kg (Paddy), 38 kg (Soybean) & 78 kg (D.A.P) 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
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 relevent 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.)	Thinckness of transparent plastic tube of seed and fertilizer is 2.8 and 2.9 mm respectively.	Conforms
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 0.75 to 1.47 (Paddy) 0.85 to 1.21 (Soybean) & 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 0.77 to 2.21 (Paddy) 0.80 to 1.31 (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 Conform
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 0.78 to 1.35 (Soybean) & 0.76 to 2.80 (Paddy) percent.	**Does not conform**
Cl. 9.5 For Seed Only	The variation in dropping due to box filling at ¼, ½ and ¾ of rated capacity shall not exceed 10 percent	The variation in dropping due to box filling at ¼, ½ and ¾ of rated capacity of seed & fertilizer, observed from 1.74 to 2.36 & 1.82 to 2.21, 1.81 to 2.23, (Soybean), 1.47 to 3.14, 1.44 to 3.25 1.42 to 3.38, (Paddy) and 1.79 to 2.25, 1.69 to 2.45, 1.77 to 2.30, (D.A.P) for seed & fertilizer respectively.	Conforms
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 0.77 to 2.21 (Paddy) &	Conforms

		0.80 and 1.31 (Soybean) persent.	
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 allignment 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 moving should be provided. This arrangement should be without disturbing the setting of metering mechanism.	The drill have plate type mechanism for quick cutt- off of the seed &fertilizer respectively.	Conforms

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) Press roller	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 deterioration in transit and storage	Conforms

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 field 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	18730	8.6	Nil
INDRAYNI (Paddy)	0.58	28950	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	7040	7000	40	0.56
2	7035	7000	35	0.99
3	7050	7005	45	0.63
4	7090	7020	70	0.98
5	7080	7030	50	0.70

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	0.28	**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.)	0.037	Conforms
5.	Phosphorous (P)	0.05 (max.)	0.066	Conforms

8. FIELD TEST

Field test of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR was conducted at Pune (Maharastra) 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	Ranage of measurement
1.	Av. Depth of seed sowing, cm	5.33 to 6.33
2.	Av. Depth of fertilizer placement, cm	5.00 to 6.00
3.	Av. Width of sowing, m	2.30 to 2.31
4.	Av. Forward speed, kmph	3.38 to 3.66
5.	Av. Draft, Kgf	350 to 375
6.	Field capacity, ha/h	0.532 to 0.640
7	Field efficiency, %	62.58 to 81.01
8.	Seed rate, Kg/ha	128.350 to 148.0 (Soybean), 50.50 to 58.50 (Paddy)
9	Fertilizer rate, Kg/ha	238.50 (D.A.P)
10.	Fuel consumption, l/h	3.600 to 3.900

8.1 Quality of work:

The average depth of seed and fertilizer placement was observed as 5.33 to 6.33 and 5.00 to 6.00 cm. Application rate kg/ha for seed and fertilizer were found 128.350 to 148.0 (Soybean), 50.50 to 58.50 (Paddy) & 238.50 (D.A.P) respectively.

8.2 Rate of Work & Fuel consumption :

The average width of sowing was observed as 2.30 to 2.31 m. The area covered was 0.532 to 0.640 ha/h and fuel consumption varied from 3.600 to 3.900 l/h.

8.3 Field efficiency and labour requirement:

Field efficiency of machine was observed as 62.58 to 81.01% .

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 0.56 to 0.99 % 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 requirments 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) Type of forrow opners of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR are not as per IS: 6813-2000. Suitable improvement should be done at production level.

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 improv in future production as per IS: 6813-2000.
Dimension of three-point linkage will be improve in future production as per Indian Standard.
Type of furrow opener of Multi-Crop Seed Cum Fertilizer Zero Till Planter/DSR will be improve 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-	02/03/22

ANNEXURE-1

BRIEF SPECIFICATIONS OF THE TRACTOR USED DURING FIELD TEST

1	Make, model and type	Mahindra Arjun 555 DI
2	Number of cylinders	4
3	Maximum PTO power, Kw	38.7
4	Power at standard Power Take-Off speed, 540± 10 rpm, Kw	2350
5	Rated engine speed, rpm	2100
6	No load engine speed during field test, rpm	1900
7	Drawbar power, Kw	32.5
8	**Drawbar pull, kN :**	
	- Without ballast	14.8
	- With ballast	23.4
9	Type of wheel equipment	Pneumatic
10	**Number & size of tyre :**	
	Front	Two, 7.50-16- 8PR
	Rear	Two, 16.9-28, 12PR
11	**Standard track width, mm :**	
	- Front	1390
	- Rear	1540
12	Wheel base, mm	2125
13	Ballast condition	Used as Un ballast
14	**Total Operational Mass, kg :**	
	- Front	925
	- Rear	1435
	- Total	2360

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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			Min	Max
3.0	Full	Max.	290	250	255	245	225	230	290	250	200	149.00	223.50	1.69	2.45
		Med.	160	135	140	145	140	120	200	225	160	95.00	142.50	1.53	2.88
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	200	170	180	210	180	205	230	240	255	124.67	187.00	1.67	2.50
		Med.	140	130	145	135	160	155	135	140	145	85.67	128.50	1.81	2.23
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	280	290	265	220	250	240	290	265	270	158.00	237.00	1.76	2.32
		Med.	140	165	165	170	160	140	150	165	170	95.00	142.50	1.82	2.21
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	280	290	280	270	265	240	290	280	270	164.33	246.50	1.83	2.21
		Med.	150	140	160	165	170	180	190	160	165	98.67	148.00	1.74	2.36
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
5.0	Full	Max.	350	340	395	340	350	340	365	300	300	205.33	308.00	1.76	2.32
		Med.	240	230	295	230	220	230	240	265	240	146.00	219.00	1.75	2.34
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	355	340	330	330	370	300	340	350	340	203.67	305.50	1.81	2.23
		Med.	290	240	250	235	240	240	230	230	260	147.67	221.50	1.79	2.26
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	390	340	365	370	380	390	365	370	380	223.33	335.00	1.87	2.15
		Med.	290	280	290	280	265	280	270	290	290	169.00	253.50	1.91	2.09
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	400	410	390	360	370	380	390	360	365	228.33	342.50	1.88	2.14
		Med.	290	290	280	290	265	270	290	290	265	168.67	253.00	1.91	2.09
		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			Min	Max
3.0	Full	Max.	60	70	75	85	95	100	110	105	100	53.33	80.00	1.55	2.83
		Med.	40	45	50	60	75	65	90	85	75	39.00	58.50	1.44	3.25
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	100	105	110	120	130	90	95	85	75	60.67	91.00	1.58	2.73
		Med.	40	45	50	95	75	85	65	60	70	39.00	58.50	1.42	3.38
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	100	105	110	100	95	65	85	75	90	55.00	82.50	1.59	2.69
		Med.	60	45	50	90	65	45	40	60	55	34.00	51.00	1.44	3.25
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	100	105	45	85	90	90	85	75	95	51.33	77.00	1.43	3.33
		Med.	60	75	40	45	65	70	75	40	35	33.67	50.50	1.47	3.14
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
5.0	Full	Max.	120	130	140	165	160	130	140	165	140	86.00	129.00	1.73	2.38
		Med.	95	100	100	95	85	75	80	90	85	53.67	80.50	1.75	2.33
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	110	120	125	110	140	165	120	130	140	77.33	116.00	1.67	2.50
		Med.	90	95	85	65	70	90	85	95	100	51.67	77.50	1.65	2.54
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	120	130	140	165	170	175	180	190	185	97.00	145.50	1.63	2.58
		Med.	100	900	105	95	75	100	95	85	120	111.67	167.50	1.08	13.00
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	110	120	130	100	140	150	160	120	130	77.33	116.00	1.63	2.60
		Med.	95	65	110	105	95	85	100	95	85	55.67	83.50	1.59	2.69
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-

ANNEXURE-IV

SUMMARY OF STATIONARY CALIBRATION (SEED)

Forward speed (kmph)	Level of seed in hopper	Rate setting	Weight of seed from furrow openers (g)									Avg.	Seed rate (Kg/ha)	Variation from average (%)	
			1	2	3	4	5	6	7	8	9			Min	Max
3.0	Full	Max.	450	430	390	360	495	460	430	460	390	257.67	386.50	1.73	2.38
		Med.	200	230	290	135	140	150	160	165	200	111.33	167.00	1.47	3.15
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	415	400	445	460	510	400	360	345	400	249.00	373.50	1.68	2.48
		Med.	230	240	235	245	200	240	240	245	260	142.33	213.50	1.77	2.30
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	300	390	300	390	380	360	300	340	350	207.33	311.00	1.77	2.30
		Med.	215	220	240	260	200	290	260	275	200	144.00	216.00	1.69	2.45
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	400	470	390	365	370	380	365	370	380	232.67	349.00	1.78	2.29
		Med.	230	240	265	290	280	265	270	280	265	159.00	238.50	1.79	2.26
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
5.0	Full	Max.	500	500	390	400	450	500	600	600	700	309.33	464.00	1.56	2.79
		Med.	285	300	295	400	290	300	340	400	450	204.00	306.00	1.63	2.58
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¾	Max.	520	590	670	670	625	635	630	625	600	371.00	556.50	1.78	2.29
		Med.	400	390	360	390	340	345	225	360	365	211.67	317.50	1.56	2.78
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	½	Max.	500	560	580	590	560	565	570	580	600	340.33	510.50	1.83	2.20
		Med.	400	430	390	370	380	390	400	410	415	239.00	358.50	1.86	2.16
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-
	¼	Max.	510	520	530	365	580	570	580	530	540	315.00	472.50	1.63	2.59
		Med.	290	410	515	390	380	390	370	365	390	233.33	350.00	1.56	2.78
		Min.	-	-	-	-	-	-	-	-	-	-	-	-	-

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		
3.0	Recommended rate setting for field	0.30	0.40	0.50	0.60	0.30	0.50	0.20	0.30	0.40		
		0.20	0.30	0.40	0.30	0.40	0.40	0.30	0.20	0.30		
	Average	0.25	0.35	0.45	0.45	0.35	0.45	0.25	0.25	0.35	0.28	1.5-2.8
5.0	Recommended rate setting for field	0.80	0.30	0.40	0.50	0.60	0.30	0.40	0.40	0.50		
		0.70	0.60	0.50	0.70	0.40	0.50	0.50	0.50	0.40		
	Average	0.75	0.45	0.45	0.60	0.50	0.40	0.45	0.45	0.45	0.40	0.76-1.43

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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		
Recommended rate setting for field	No. of seeds dropped per metre of row length	23	24	22	25	23	28	27	30	28		
		27	26	25	24	25	30	25	23	30		
		24	27	31	29	28	25	29	26	32		
	Average	24.66	25.66	26.00	26.00	25.33	27.66	27.00	26.33	30.00	26.54	1.82-2.21
Recommended for seed sowing	Av. distance between two seed (mm)	7	8	4	5	6	7	5	6	5		
		5	4	6	3	5	6	3	4	4		
		3	6	6	6	3	4	2	5	5		
	Average	5.00	6.00	5.33	4.66	4.66	5.66	3.33	5.00	4.66	4.92	0.77-1.40

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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		
3.0	Recommended rate setting for field	0.20	0.20	0.22	0.19	0.18	0.23	0.20	0.23	0.22		
		0.24	0.16	0.18	0.20	0.19	0.20	0.18	0.21	0.18		
	Average	0.22	0.18	0.20	0.19	0.18	0.21	0.19	0.22	0.20	0.9	0.90-1.11
5.0	Recommended rate setting for field	0.50	0.70	0.540	0.60	0.60	0.50	0.50	0.80	0.60		
		0.60	0.80	0.60	0.80	0.40	0.80	0.60	0.90	0.50		
	Average	0.55	0.75	0.55	0.70	0.50	0.65	0.55	0.85	0.55	0.62	0.78-1.35

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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		
Recommended rate setting for field	No. of seeds dropped per metre of row length	14	15	16	18	19	20	22	24	20		
		20	18	19	12	15	14	16	17	16		
		22	14	16	15	20	22	14	18	14		
	Average	18.66	15.66	17.00	15.00	18.00	18.66	17.33	19.66	16.66	17.40	0.88-1.15
Recommended for seed sowing	Av. distance between two seed (mm)	7	8	9	7	6	5	4	3	1		
		4	2	2	5	6	4	6	5	4		
		6	6	4	4	1	2	8	4	6		
	Average	5.66	5.33	5.00	5.33	4.33	3.66	6.00	4.00	3.66	4.77	0.80-1.31

ANNEXURE -IX

SUMMARY OF FIELD TEST

Place of test : PUNE (MAHARASTRA)

Tractor used : Mahindra Arjun 555 DI

Gear Used : L-1

S.No.	Test Number	1	2	3
1.	Date of test	9-11-21	10-11-21	11-11-21
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	3.38	3.45	3.66
5.	Av. Wheel slip ,%	2.33	3.33	3.66
6.	Fuel consumption ,l/h.	3.600	3.800	3.900
7.	Av. Depth of sowing ,cm Seed Fertilizer	 5.33 5.00	 5.83 6.00	 6.33 5.66
8.	Av. Width of sowing ,m	2.30	2.31	2.31
9.	Seed rate setting ,kg/ha	128.350 to 148.0 (Soybean), 50.50 to 58.50 (Paddy)		
10.	Fertilizer rate setting ,kg/ha	238.50 (D.A.P)		
11.	Field capacity ,ha/h	0.551	0.640	0.532
12.	Field efficiency ,%	71.55	81.01	62.58
13.	Av. Draft ,kgf	350	360	375

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.	**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	m
7	Maximum	Max	m

ABBREVIATIONS:

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