COMMERCIAL TEST REPORT **REPORT NO:IMP-2011/314**

MONTH: JULY 2021

सत्यमेव जयते

SUPER SEEDER
BEW-(15ROW)

TESTED AT

STATE LEVEL FARM MACHINERY TRAINING AND TESTING INSTITUTE, REHMANKHERA, 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 19.06.2021 TO 18.06.2026

TEST REPORT NO.	NAME OF THE MACHINE/IMPLEMENT, MODEL NO.	MONTH	YEAR
IMP-2011/314	SUPER SEEDER BEW- (15 ROW)	JULY	2021

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Type of test	:	Commercial
Name of machine	:	SUPER SEEDER BEW- (15 ROW)
Test Code referred	:	IS: 4468- 2001(Pt.-1): Agricultural Wheeled Tractors-Rear Mounted Three Point Linkage. IS: 4931- 2004- Agricultural Tractors-Rear Mounted P.T.O. IS: 6690- 2002-Specification For Blades For Rotavator For Power Tillers. IS: 6316-1999- Test Code For Seed Cum Fertilizer Drill. IS :6813-2000- Sowing Equipment Seed Cum Fertilizer Drill- Specification. IS: 11531-1995 (Reaffirmed) Test Code For Puddler.
Test requested by	:	M/S Bhagwan Engineering Works, Raikot Road, Malerkotla, Dist- Sangrur, Punjab-148023
Testing Authority	:	State Level Farm Machinery Training And Testing Institute, Rehmankhera, HardoiRoad,Lucknow, U.P. - 226101
Period of test	:	JANUARY 2021 TO JULY 2021

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:-

i) Specifications.

ii) Laboratory tests to assess ;

- Uniformity in seed and fertilizer metering at the specified rate setting for wheat seed including maximum setting.
- Variation in seed and fertilizer rate due to different depths of seed and fertilizer in seed and fertiliser boxes.
- percentage of seed damage in metering system .
- Variation in seed rate due to change in speed.
- Hardness & chemical composition analysis of primary element of rotor blade and furrow openers.

iii) Field tests to evaluate the suitability of Super seeder with regard to:-

a) Quality of work with reference to.
b) Seed and fertilizer placement.
c) Rate of work.
d) Power requirement for seeding & rotor unit.
e) Labour requirement.
f) Ease of operation, maintenance and adjustments.

2. TEST PROCEDURE/ CODES:

There is no specific BIS code for testing of Super seeder, however the following codes were referred to test the super seeder as mutually agreed by applicant and testing authority ;-

i) IS: 4468- 2001(Pt.-1): Agricultural wheeled tractors-Rear mounted three point linkage.
ii) IS: 4931- 2004- Agricultural tractors-Rear mounted P.T.O.
iii) IS: 6690- 2002-Specification for Blades for rotavator for power tillers.
iv) IS: 6316-1999- Test code for seed cum fertilizer drill.
v) IS :6813-2000- Sowing equipment seed cum fertilizer drill- specification.
vi) IS: 11531-1995 (Reaffirmed) Test code for Puddler.

3. METHOD OF SELECTION

The machine was selected by representative of the testing authority out of 10 machines made available for selection from their periodical production line at manufacturer's site. machines of sr.no BEW-215SB001 was selecte for testing.

4. BRIEF DESCRIPTION OF EQUIPMENT

The Super seeder is operated by a tractor of 60 hp and is combination of rotavator & seed cum fertilizer drill i.e. rotar & sowing unit respectively. The rotor unit contains two sets of 'LJF' shape blade in front of each furrow opener. During operation the rotor blade cuts the loose standing stubble weeds in field. and then evenly mulch at on the soil surface. The machine is transported on three point linkage of tractor. The rotor unit is operated by tractor pto shaft whereas its seeding unit gets the drive from ground

wheel seed cum fertilizer unit place the seed and apply the fertilizer at pre determined rate.This machine eliminate the chocking of furrow openers particularly in weed field during the direct seeding by machine. It also adds the organic manure to the soil and eliminate the environmental pollution causes due to burning of weeds residue on field . Mulching of hay charge on the ground field also helps in retention of soil moisture.

5. SPECIFICATIONS

5.1	**GENERAL**		
	Name & address of manufacturer/applicant	:	M/S Bhagwan Engineering Works, Raikot Road, Malerkotla, Dist- Sangrur, Punjab-148023
	Type	:	Tractor mounted.
	Make	:	Bhagwan Engg. Works.
	Model	:	BEWSS-15R
	Year of manufacture	:	2021
	Serial No.	:	BEW-215SB001
	Tractor horse power required,hp (apa)	:	60 and above.
	Tyep of blade	:	L-Type hatched blade.
	Recommended travelling speed of machine, kmph	:	3.12-3.26 (Observed during field test of super seeder.)
5.2	**PRIME MOVER USED**		
	Tractor	:	JHON DEERE-5310 V6
	Chassic No.	:	1PY5310ECKA039752
	Year of manufacture	:	2018
	Max. PTO Power Kw	:	36.4
	Tractor engine speed recommended for field test, rpm (apa)	:	1800
5.3	**CHASSIS**		
	Type of frame	:	M.S Square box.
	Size of box, mm Front Rear	 : :	 2745×60×60 2830×60×60
	Type of mounting of box section	:	Welded to top cover and side support.
5.4	**SIDE SUPPORT**		
	Type of support	:	M.S Plate.
	Thickness of plate,mm	:	10 & 8
	Method of fixing to main frame	:	Welded to top cover and chassic box at frame.
5.5	**SHIELD (TOP COVER)**		
	Type	:	M.S. sheet fabrication.
	Size of shield,mm Length Peripheral width	 : :	 2745 575

	Thickness of sheet ,mm	:	4.0
	Method of fixing to main frame	:	Welded to Main box frame.
5.6	**ROTOR UNIT**		
5.6.1	**ROTOR SHAFT**		
	Type	:	M.S. pipe mounted on solid M.S. rod at both ends. The flanges at both sides support solid shaft rod are welded to the pipe to frame Integral unit of shaft.
	Length of shaft, mm ground wheel side opposite to ground wheel side Dia of shaft	 : : :	 1085 1300 90
	Size of rotor pipe ,mm Length Dia	 : :	 2600 90
	Method of mounting of rotar shaft	:	The outer end of solid shaft is supported on bearing at both side of super seeder.
	Dia. of rotor with blades,mm	:	450
	Tractor pto rpm corresponding to 1800 rpm of engine (on load)	:	540±10
	Speed of rotor shaft corresponding to 540 rpm of pto shaft,rpm	:	185
5.6.2	**ROTOR BLADE**		
	Number	:	66
	Type	:	L Type
	Overall thickness,mm	:	8.0
	Thickness at tip, mm	:	2.38
	Method of mounting blades on rotor pipe	:	Blade is fitted with 2 nut and bolt on each flange.
	Size of bolt,mm Length Dia Pitch	 : : :	 40 13.87 1.5
	Distance between two adjustment blades,mm	:	45
	Peripheral speed of rotor blades (m/sec.)	:	258
	Clearance of blade from the tip of the blade to ground	:	0 to 15
	Safety provision from clod particles	:	Back side Provided Size (2745×230×3.0)

5.7	**DEPTH CONTROL MECHANISM**		
	Method of depth control adjustment	:	skid and press wheel are provided.
	Range of depth adjustment,mm	:	0 to 100
5.8	**POWER TRANSMISSION SYSTEM FOR ROTOR UNIT**		
	Method of transmission	:	Propeller shaft receives drive from PTO and transmits power to rotary shaft through two spur gear & one Pinion bevelled gear reduction units, primary and secondary, consisting of gear reduction respectively.
5.8.1	**Gear box (Primary reduction unit)**		
	Type	:	Bevel & pinion.
	No.of teeth on pinion	:	11
	No. of teeth on bevel gear	:	22
	Gear ratio, power input to output shaft	:	1:0.55
	Oil capacity, I	:	3.5
	Oil change period, h apa	:	200
	Recommended grade of oil, apa	:	EP-140
	No & type of bearings	:	06 & No.Taper Roller Three 32209, Two 32212, One 32215
	Recommended pto rpm of tractor	:	540±10
	Method of mounting	:	Bolted to auxiliary fram of 3 point linkage system & top of rotor unit fram.
5.8.2	**Secondary reduction**		
	Type	:	Gear drive
	Teeth of drive gear,mm	:	20
	Teeth of Idler gear,mm		37
	Teeth of drive gear,mm	:	28
	Speed ratio	:	1:0.71
	Overall speed ratio from primary input shaft to rotar shaft	:	1:0.42

5.9 Dimensions of power input shaft (Ref. Fig.2)

Notation	As per IS:4931-1996 (mm)	As observed (mm)	Remarks
D ø	34.79 ± 0.06	34.84	Conforms
d ø	28.91 ± 0.05	28.87	Conforms
S	8.69 (max.)	8.5	Conforms
R	6.7 ± 0.25	5.9	**Does not conform**
ά	30°	30°	Conforms
Q	7.0	7.0	Conforms
H	38.0	37.8	**Does not conform**
A	54.0 (min.)	55.26	Conforms
B	76.0 (min.)	79.02	Conforms

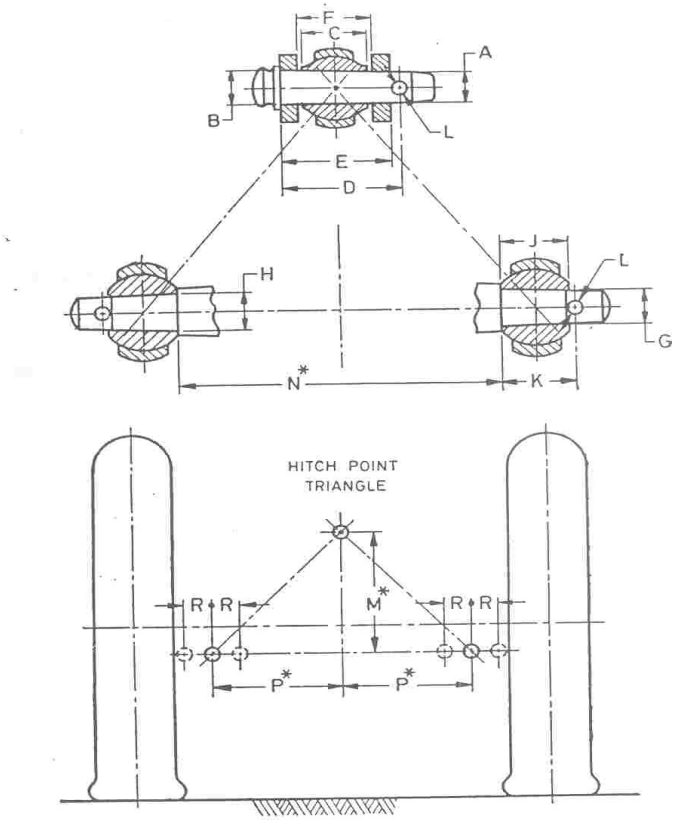

FIG. 1. DIMENSIONS OF HITCH POINTS

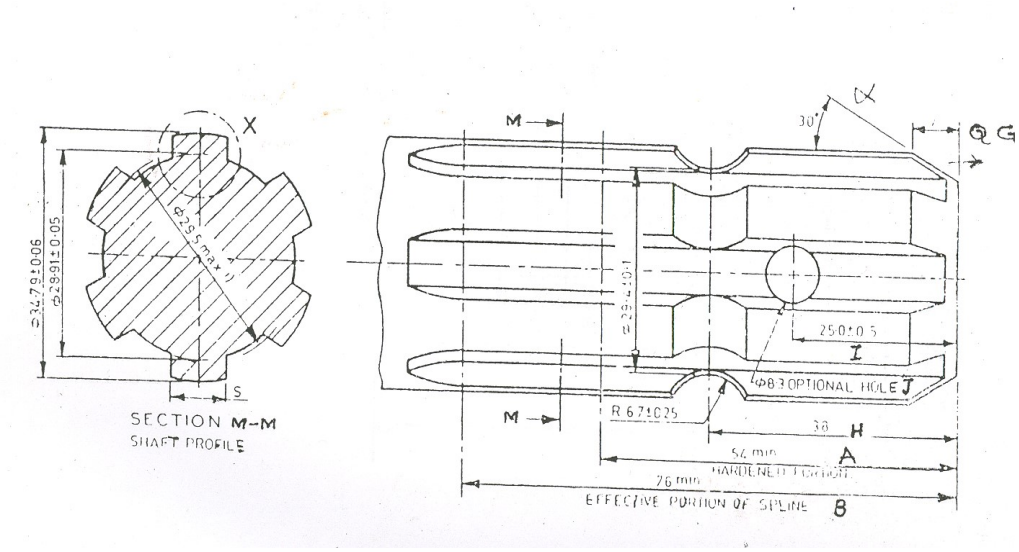

Fig.2 - Dimensions of power input shaft

5.10 SEED CUM FERTILIZER UNIT

5.10.1 FURROW OPENERS

Type	:	Double Disc Type Opner.
No. of openers/	:	15
Arrangement of openers	:	Inline in intermediate box frame.
Range of selection of openers	:	Not applicable.
Method of changing row space and range	:	By changing the stepless spacing of tine on the tool bar through U clamp.
Lifting and lowering of openers	:	Three Point linkage by hydraulic system.
Depth control	:	Press wheel are provided and range from 0 to 100 mm.
Fertilizer placement with respect to seed	:	45.0 mm a head of seed and fertilizer outlet in the same row.

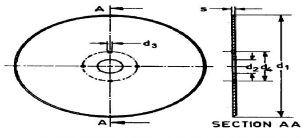

FIG. 02-A. FLAT DISC TYPE FURROW OPENERS (IS 6813-2000)

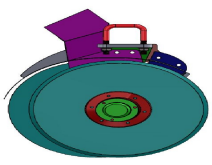

FIG. 02-A. FLAT DISC TYPE FURROW OPENERS IN MACHINE

5.10.2 SEED/ FERTILIZER METERING MECHANISM

		Seed metering mechanism	fertilizer metering mechanism
Type	:	Fluted feed roller	Fluted feed roller
Size of feed shaft,mm.	:	2800×19	2800×19
Fluted feed roller			
Dia,mm	:	48	48
No.	:	15	15
Source of power	:	By lugged Ground wheel through chain & sprocket	By lugged Ground wheel through chain & sprocket.
Tranmission ratio of shaft of seed & fertilizer metering device to ground wheel	:	1:0.73	1:0.73
Type of agitator	:	Not provided	Not provided
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 a lever provided.	By varying the length of the flutes with respect to fertilizer outlet of hopper through a adjusting lever provided.
Provision for closing seed discharge	:	When the fluted rollers are completely out of the roller feed cup. The seed feed cut-off roller covers the hopper gate closing the seed discharge gate.	When the fluted rollers are completely out of the roller feed cup. The fertilizer feed cut- off roller covers the hopper gate closing the fertilizer discharge gate.

5.11	**HOPPER**			
	Capacity, m'(kg) Seed box Fertilizer box	: :	125 150	
	Type of hoppers	:	Trapezoidal M.S. sheet with cover.	
	Marker details	:	Not provided.	
	Seed Covering arrangements	:	Provided.	
5.12	**GROUND WHEEL**			
	No.of wheels Type of wheels Outer dia. Of wheel, mm Method of transmitting power to feed shaft.	: : : :	1 Lugged M.S. flat 785 Through chain and sprocket	
	±Detail of lowering & raising ground wheel	:	Through spring loaded telescopic shaft, with stepless setting upto 20 mm.	
	Depth adjustment provision for super seeder	:	Press wheel and skid are provided.	
	Safety arrangement for rotating parts	:	Chain cover is provided.	
5.13	**Metering unit controls**		**Seed metering control lever**	**Fertilizer metering control lever**
	Material & Type	:	M.S. Flat	M.S. Flat
	Size,mm L×W×T	: :	270×35×4.0	
	Height from ground level,mm	:	1415	1415
5.14	**Type of hitch & its details:**			
	Type	:	M.S.flat fabrication.	
	Shape	:	Pyramid.	
	Size of flat, mm(Lenght×width)	:	612×65	
	Thickness of plate,mm	:	8	
	Length of lower link hitch pin,mm	:	105	
	Height of lower link hitch pin, from ground level mm	:	475	

Three point linkage (Refer fig.1)				
Dimension	**Description**	**As per IS:4468-(Part-I) March 2007 for Cat.-2,mm**	**As observed,mm**	**Remarks**
Upper hitch attachments				
d1	Diameter of hitch pin hole	25.70±0.20	25.86 -R 26.62 - B	Partially Conforms
b'1	Width between outer faces of yoke	86.0 (max)	72.12	Conforms
b'2	Width between inner faces of yoke	52.0 (min)	56.02	Conforms
Lower hitch points				
D2	Dia of hitch pin	28.0±0.20	28.28	Conforms
b¹3	Linch pin hole distance	49.0 (min)	95.37	Conforms
1	Lower hitch point span	825±1.5 or lesser preferably 683	860 (But-Adjustable)	Conforms
Other Dimensions				
d	Diamerer for linch pin -for upper hitch pin, min. -for lower hitch pin, Min	12 12	10.5 10.5	**Does not conform** **Does not conform**
h	Mast height	610±1.5 or higher within a range of 810±1.5	570	**Does not conform**

5.16 Overall Dimensions, mm (Ref. Fig.2)

Length : 1630

Width : 3170

Height : 1480

Mass, kg : 1080 (apa)

No. of greasing/oiling points:

Greasing point : 22

Oiling point : 36

6.0	**CONFORMITY WITH BIS REQUIREMENTS** **CI.6.0 IS 6813-2000 Material of construction of different components**			
SI. 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 & fretilizer boxes	Mild steel, Galvanised iron sheet,Seasoned wood, Plastic, fibre reinforced plastic.	Mild steel sheet	Conforms
4.	Tines / disc	Mild steel, Carbon steel.	Mild steel	Conforms
5.	Boot	Mild steel, Cast iron.	--	--
6.	Wheel	Mild Steel,Cast iron,Pneumatic.	Mild steel	Conforms
7.	Seed agitator	Mild steel,Cast iron, Aluminium, PVC,Rubber,Canvas.	N.A	--
8.	Furrow opener (disc type)	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
11.	Seed metering mechanism(fluted roller type)			
a.	Seed feed roller, seed feed cut off and seed plate	Cast iron, Mild steel, nylon.	Aluminium casted	**Does not conform**
b.	Seed feed cup	Aluminium.	Aluminium.	Conforms
c.	Retaining ring and cover	Brass,gun metal, bakelite.	Aluminium	**Does not conform**
12.	**Fertilizer metering mechanism (fluted roller type)**			
a.	Seed feed roller, seed feed cut off and seed plate	Cast iron, mild steel, nylon.	nylon	Conforms
b.	Seed feed cup	Aluminium.	Aluminium.	Conforms
c.	Retaining ring and cover	Brass, gum metal,bakelite.	Aluminium	**Does not conform**
13.	Bushes	Brass, gun metal, Nylon.	Mild steel	**Does not conform**
14.	Covering device	Mild steel,Cast iron, seasoned wood.	Not provided	**--**
15.	Pulley, Sprocket	Cast iron,Mild steel.	Mild steel	Conforms
16.	Hitching Mechanism	Mild steel.	Mild steel	Conforms

17.	Feed adjusting Mechanism	Mild steel,Cast iron.	Mild steel	Conforms
18.	Depth adjusting Mechanism	Mild steel,Cast iron.	Mild steel	Conforms
19.	Row marker	Mild steel.	Not provided	--
	CI.7 1 HARDNEESS	The furrow openers (disc type) shall be hardened to have brinell hardneess between 53 to 59 HRC as per IS: 6690-Jan. 2007.	55,56,54	Conforms
	CI.8 CONSTRUCTION REQUIREMENTS			
	CI. 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.	Tool bar frame is made of M.S. box of size 60×60 mm. Tines are fitted with U clamped bolt & nut to rear tool bar,for stepless row spacing of seed & fertilizer.	Conforms
	CI.8.2 Wheels	Wheels should have either bushes or dust proof bearings.They should be strong and shall be provided with luge/ pegs.Wheels should be so attached that they can be easily lowered or raised.	Wheel has ball bearing (1311**)** Provided with lugs and raising & lowering arrangement.	Conforms
	CI.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 has been made.	Conforms
	CI.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 90 kg and 100 kg respectively which is adequate. The shape of seed and fertilizer boxes are trapezoidal.	Conforms

		c) The boxes should be adequately covered to avoid entrance of water.	The boxes are Covered.	Conforms
		d) The boxes should be sufficiently strong and should not buckle when fully filled with seed and fertilizer.	The boxes are strong and no buckling of the boxes was noticed when filled fully capacity.	Conforms
		e) The boxes should be provided with self locking mechanism on being opened.	Self locking Mechanism is not provided but locking Mechanism is provided.	**Does not conform**
	CI.8.4.1	The thickness of mild steel and galvanized steel sheet for boxes shall be not less than 1.0mm and 0.63mm respectively.	M.S. sheet of 1.8 mm thickness is provided.	Conforms
	CI.8.5 Tines	Tines/disc should be properly attached with tool bar either by bolts and nuts or with clamps.	Disc are properly attached with U-clamps with bolts & nuts.	Conforms
	CI.8.6 Furrow Openers	Furrow openers of shovel shoe or disc type shall conform to the requirements as given in IS: 6813-2000 separately.	Disc type furrow openers properly attached with U-clamps with bolts & nuts.	Conforms
	CI.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 plasti tube is 2.51 mm.	Conforms
	CI.8.8 Metering Mechanism			
	CI. 8.8.1 The seed Metering mechanism components of fluted feed roller and plate type shall be in conformity to the requirements as given in IS: 6813-2000			
	CI. 8.8.1 CI.1	*Fluted feed roller type* Fluted feed roller shall be of eithed of three type namely. type 1,type 2,type 3 fig (CI.1).	Fluted feed roller of type-2,is provided dimensions are not conforming to IS requirement	**Does not conform**

	C-1.2	*Seed feed cut off* Seed feed cut off shal be of either of three types namely type 1, type 2, type 3. The hole for shaft in cut off may be either cilrcular or square. fig (CI.2).	Seed feed cut off of type -2,3 is provided but dimensions are not conforming to IS requirement.	**Does not conform**
	C-1.3	*Retaining ring and cover* The dimensions of retaining ring and cover shall be as stipulated in figure C-1.3 of IS: 6813-2000.	Dimensions of retaining ring and cover are not as per IS:6813-2000	**Does not conform**
	C-1.4	The dimensions of seed cup should be as specified in Figure C-1.4 of IS: 6813-2000.	Dimensions of seed feed cup are not as per IS: 6813-2000	**Does not conform**
	CI.8.8.2	The fertilizer metering mechanism components of fluted feed roller and plate type shall conform to the requirements of IS: 6813-2000.	The fertilizer metering mechanism of fluted feed roller type is provided but Components are not conforming IS: 6813-2000	**Does not conform**
	CI.9 Performance Requirements			
	CI.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 seed and fertilizer in different feeding outlets separately was observed from 0.59 to 1.41 and 0.67 to 1.33 respectively.	Conforms
	CI.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 0.84 to 1.16 and 0.78 to 1.21 percent for seed and fertilizer respectively	Conforms

	CI.9.3	The seed and fertilizer rate shall be easily adjustable upto 125kg and 1000 kg per hectare respectively.	Required adjustment is provided .	Conforms
	CI.9.4	The percentage of visible damage to seed in the machine shall not exceed 0.5 percent.	The percentage of mechanical damage to seed in the machine was observed from 0.180 to 0.237 and 0.163 to 0.217 in different speed.	Conforms
	CI.9.5	The variation in dropping due to box filling at ¼, ½ and ¾ of rated capacity shall not exceed 10 percent in 3kmph speed.	The variation in dropping due to box filling at ¼,½ and ¾ of rated capacity of seed observed from 0.87 to 1.19,0.12 to 1.88 and 0.76 to 1.24, respectively & fertilizer 0.86 to 1.14,0.85 to 1.15, 0.85 to 1.15 respectively.	**Conforms**
	CI.9.7	The variation in quantity of seed per meter of row length shall not exced by10 percent.	Not exced by 10 percent	Conforms
	CI.9.8	a) The machine shall be able to sow seed upto 100 mm deep.	The drill was able to sow seed upto 100 mm depth.	Conforms
		b) The machine shall be able to drop fertilizer at a minimum of 25 mm to the side of the seed.	Dropping of fertilizer is 45 mm ahead of the seed.	Conforms
	CI.9.11	The machine 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 pen The drill shall also be able to sow all types of granular fertilizers.	The machine is tested to sow wheat seed only.Used with DAP only.	Conforms

	CI. 10 Other requirements			
	10.2	Row spacing shall be adjustable ranging from 150 to 225 mm preferably in steps of 25 mm.	Stepless spacing throgh U clamp with nut & bolt 55 mm.	Conforms
	10.3	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 specified limit.	Conforms
	10.4	The weight of tractor-mounted machine 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 machine.	The weight of tractor-mounted super seeder including the weight of seed and fertilizer filled at rated capacity of boxes is 255 N/Kw of drawbar power of tractor.	Conforms
	10.5	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
	10.6	In case of all the trailed machine and mounted drills having plate type mechanism arrangement for quick cut- off of the seed & Fertilizer when the machine is moving should be provided. This arrangement should be without disturbing the setting of metering mechanism.	Not applicable as the plate type metering mechanism is not provided.	--------
	10.7	Lubrication arrangement should be provided for all moving components except the portions exposed to seed & fertilizer.	Required arrangement is provided	Conforms
	10.8	For tractor operated machine the system of hitching should be designed to suit the three point linkage and drawbar of agricultural tractors.	Not match in IS relevant code**.**	**Does not conform**

	10.9	Each machine should be provided with instruction sheets containing full information on method of operation.	Provided.	Conforms
	10.9.1	Each machine shall also be supplied with necessary tools.	Provided.	Conforms
	10.9.2	Provision should be made for easy removal of seed and fertilizer from the hopper after the days work.	Provision Provided.	Conforms
	10.9.3	Each machine should be provided with a manual containing maintenance and storage instruction, calibration chart etc.	Provided.	Conforms
	CI.11 Accessories	The following accessories may be provided with each drill:- a) Foot board b) Covering device c) Row marker d) Press wheel e) Area recorder	Only A & D is Provided	Parttialy Conforms
	CI.12 Workmanship and Finish			
	CI.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
	CI.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
	CI.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.	Conforms
	CI.12.4	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	Provided.	Conforms

7. RUNNING-IN

The super seeder unit was run-in for half an hour. Bolts and nuts were tightened and lubrication were done before actual test.

8. LABORATORY TEST

A. seed specifications :				
Variety	Bulk density, gm/cc	No.of seeds in one kg sample	Moisture content, %	Broken, (%)
HD-226	0.819	31090	8.82	NIL

B. Fertilizer specification	
Type	**Bulk density, gm/cc**
DAP	0.986

C. Wear of soil engaging component :

The test sample was operated for 25.0 hours. Wear of soil engaging components (furrow openers & rotor blade) are given in table –1

Table – 1: Wear assessment of furrow opener (disc type) & blade on mass basis.

Wear of furrow openers (Tyne)					**Wear of rotor blade (L-Type)**				
SI. No.	Mass of disc before test.Kg	Mass of disc after test.g	Loss in mass,g	Wear, % by mass	SI. No.	Mass of rotor blade before test,g	Mass of rotor blade after test,g	Loss in mass,g	Wear, % by mass
1.	16.700	16665	35	0.20	**1.**	1000	970	30	3.0
2.	16.500	16472	28	0.16	**2.**	1012	990	22	2.17
3.	16.450	16410	40	0.24	**3.**	1040	1015	25	2.40
4.	16.480	16442	38	0.23	**4.**	1019	995	24	2.35
5.	16.715	16683	32	0.19	**5.**	1037	1015	22	2.12
6.	16.605	16570	35	0.21	**6.**	1003	975	28	2.8
7.	16.360	16332	28	0.17	**7.**	1010	990	20	1.98
8.	16.500	16472	28	0.16	**8.**	993	970	23	2.31
					9.	1040	1015	25	2.40
					10.	1010	990	20	1.98
					11.	1040	1015	25	2.40

Wear of Rotary blade on dimension basis								
S.No.	Width of blade before test, mm		Width of blade after test, mm		Wear (%)			
	At Tip	65 mm from Tip	At Tip	65 mm from Tip	At Tip	At Tip	65 mm from Tip	65 mm from Tip
1.	78.57	82.28	72.17	79.68	6.4	2.6	8.14	3.15
2.	78.27	82.54	71.77	80.74	6.5	1.80	8.30	2.18
3.	78.00	82.21	76.70	81.11	1.30	1.10	1.66	1.33
4.	78.20	83.45	75.20	81.35	3.0	2.10	3.83	2.51
5.	78.50	83.40	74.20	80.25	4.30	3.15	5.47	3.77
6.	77.80	82.75	74.80	79.95	3.0	2.8	3.85	3.38
7.	78.10	82.60	71.60	77.00	6.5	5.6	8.32	6.77
8.	77.15	83.30	71.75	79.10	5.4	4.2	6.99	5.04
9.	78.20	82.50	72.40	78.90	5.8	3.6	7.41	4.36
10.	78.21	82.54	71.77	80.74	6.8	1.80	8.30	2.18

E. Hardness of rotor blade

The hardness of blades was determined at Blade portion. The results of hardness test are tabulated in Table-2.

TABLE-2: Hardness

Description	AS per IS: 6690-Jan. 2007 (HRC)	Hardness as observed (HRC)	Remarks
Blade portion	53 to 59	55,56,54	Conforms

F. Chemical composition of rotor blade

SI.No	Material	Requirement as per IS:6690-Jan.2007 (% 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 2.00	0.28	**Does not Conforms**
3.	Manganese (Mn)	0.50 to 1.00	1.29	**Does not Conforms**
4.	Sulphur (S)	0.05 (Max)	0.023	Conforms
5.	Phosphorous (P)	0.05 (Max)	0.028	Conforms

G. Chemical composition of Tyne

SI.No	Constituents	Composition (% of weight)		Remark
		As per IS: 3342-1998	Observed	
1.	Carbon (C)	0.50 to 0.60	1.74	**Does not Conforms**
2.	Silicon (Si)	1.50 to 2.00	0.36	**Does not Conforms**
3.	Manganese (Mn)	0.50 to 1.00	0.36	**Does not Conforms**
4.	Sulphur (S)	0.05 (Max)	0.10	Conforms
5.	Phosphorous (P)	0.05 (Max)	0.023	Conforms

9. FIELD TEST

Field test of super seeder was conducted at instiute farm site for 25.0 hours consisting of 4 trials. The implement was used for sowing Wheat after any cultivation or tillage. The detailed test results are given in Annexure-IV and are summarised as under :-
Soil moisture,20 to 25%.

Summary of field test results :

SI.No.	Parameters	Ranage of measurement
1.	Av. Depth of seed sowing, cm	7.0 to 8.5
2.	Av. Depth of fertilizer placement, cm	7.5 to 4.0
3.	Av. Width of sowing, m	2.68 to 2.71
4.	Av. Forward speed, kmph	3.12 to 3.26
5.	Av. Draft, Kgf	605 to 620
6.	Field capacity, ha/h	0.612 to 0.720
7.	Field efficiency,%	72.68 to 81.93
8.	Seed rate, Kg/ha	213.18 to 384.50
9.	Fertilizer rate,Kg/ha	249.55 to 361
10.	Fuel consumption, 1/h 1/ha	5.800 to 6.400 8.062 to 10.432
11.	Av. Weight of swath/ stubbles before seeder operation, kg/m²	0.950 to 2.430
12.	Av. Length/hight of stubbles before seeder operation, cm	8.0 to 38.0

9.1 Quality of work:

9.1.1 The average depth of seed and fertilizer placement was observed as 7.0 to 8.5 cm & 7.5 to 4.0 cm. Super seeder rate was found 156 to 176 Kg/ha and 237 to 282 kg/ha. respectively.

9.1.2 The weight of swath/ stubbles before and after the seeder operation were observed as 0.950 to 2.430 kg/m².

9.1.3 The hight of stubbles before seeder operation 8.0 to 38.0 cm.

9.2 Rate of Work & Fuel consumption :

The average width of sowing was observed as 2.68 to 2.71 m. The area covered was 0.612 to 0.720 ha/h and fuel consumption varied from 5.800 to 6.400 l/h.

9.3 Field efficiency and labour requirement:

Field efficiency of machine was observed as 72.68 to 81.93 % .

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

9.4 During field operation average pto power of tractor were observed as 36.4 kw.

10. Wear of soil engaging component:

The wear of furrow openers & rotor blades on mass basis varied from 0.16 to 0.24 % & from 1.98 to 3.0 % respectively, whereas wear of the rotor blade on dimension basis at tip & 65 mm from tip varied from 1.33 to 5.04% respectively.

11. LUBRICATION & SERVICING

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

12. EASE OF OPERATION AND ADJUSTMENT

Operation and adjustment of happy seeder was observed to be satisfactory.

However, the driver has to get down from the tractor to do the adjustments on the machine.

13. SOUNDNESS OF CONSTRUCTION

No breakdown was observed during 25.0 hrs. of operation of super seeder.

14. COMMENTS AND RECOMMENDATIONS

i) The dimensions of seed metering mechanism do not conform to the requirement of IS: 6813-2000.Metering mechanism complying with IS requirements should be used at regular production level.

ii) The accessories like suitable covering device, row marker, are not provided in machine. These must be provided as per requirement of IS :6813-2000.

iii) Dimension of three point linkage does not conform to the requirments of IS:4468-March 2007. Suitable improvement should be done at production level, to comply with BIS requirements.

iv) Wear of furrow openers was found normal.

v) Variation in fertilizer dropping due to the box filling at different depth conforms to IS: 6813-2000.

vi) The variation of dropping seed and fertilizer at individual outlets does not conform to IS: 6813-2000.

vii) The fertilizer rate was not adjustable upto 1000 kg/ha, as specified in relevant BIS code, which should be looked into at production level.

viii) The seed & fertilizer boxes are covered with common cover, However a self locking mechanism should be provided on box to avoid entrance of water.

ix) Agritator and marker must be provided in the machine at regular production level.

x) All the super seeder should have an identification plate as CI 14.1 of IS: 6813 at regular production level.

xi) Carbon and Silicon, Manganese content of rotor blabe do not meet the IS requirement and therefore, blade as per IS: 6690-Jan., 2007 should be used at regular production level.

15. LITERATURE:

The manufacturer has leaflets of for operation instruction & brief specification of machine. Therefore the manufacturer should brought out a manual as per IS: 8132-1999 in Hindi or English & other regional languages for the guidance of users & service personnel.

16. APPLICANT'S COMMENTS:

- We will change the dimension of seed metering mechanism as per IS (6813-2000) to comply the Indian Standard Requirements.
- We will provide the Row Marker in Regular Production as per IS (6813-2000) to comply the Indian Standard Requirements.
- We will change the Dimension of three point linkage to confirming the IS-4468-March 2007 to Comply the BIS requirements.

TESTING AUTHORITY

(ANAND CHAUDHARI) -TEST ENGINEER-	
(DIGVIJAY SINGH) -TEST ENGINEER-	
(JIWAN PRAKASH) -ASSOCIATE PROFESSOR – ENGG.	
(VIVEK KUMAR SINGH) - DIRECTOR-	

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ANNEXURE-I

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	10	11	12	13	14	15			Min	Max
3	Full	Max.	250	240	235	240	300	240	250	280	260	290	300	205	250	230	260	348.18	383.00	0.81	1.19
		Med.	180	150	140	130	140	145	150	160	145	190	200	200	150	140	130	213.64	235.00	0.79	1.21
		Min.																-			
	¾	Max.	260	245	250	260	245	260	230	290	240	250	300	210	215	290	280	347.73	382.50	0.82	1.18
		Med.	150	160	170	180	200	210	150	140	130	135	145	165	160	150	140	216.82	238.50	0.76	1.24
		Min.																-			
	½	Max.	290	240	250	260	270	265	250	265	250	260	230	240	245	260	265	349.09	384.00	0.88	1.12
		Med.	150	140	165	180	1660	165	180	160	175	105	145	140	150	170	160	349.55	384.50	0.12	1.88
		Min.																-			
	¼	Max.	230	240	245	260	250	240	265	250	230	240	245	250	265	260	255	338.64	372.50	0.93	1.07
		Med.	160	165	150	155	150	140	145	130	160	190	160	145	150	165	180	213.18	234.50	0.81	1.19
		Min.																-			
5	Full	Max.	350	400	1290	39	385	360	365	360	330	350	360	370	380	400	405	558.55	614.40	0.06	1.94
		Med.	230	200	190	180	160	200	210	205	210	215	210	225	260	215	230	285.45	314.00	0.76	1.24
		Min.																-			
	¾	Max.	360	345	365	360	355	360	345	350	360	365	380	360	365	400	390	496.36	546.00	0.93	1.07
		Med.	200	180	190	180	190	165	180	175	200	210	215	205	225	200	220	266.82	293.50	0.85	1.15
		Min.																-			
	½	Max.	380	370	360	355	400	405	390	360	380	390	395	400	360	365	370	516.36	568.00	0.93	1.07
		Med.	205	190	180	175	190	175	180	175	190	185	160	175	190	205	210	253.18	278.50	0.86	1.14
		Min.																-			
	¼	Max.	400	370	360	365	380	355	360	375	380	390	360	355	390	400	405	513.18	564.50	0.93	1.07
		Med.	180	170	190	180	175	190	180	160	190	180	160	165	190	200	205	246.82	271.50	0.88	1.12
		Min.																-			

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ANNEXURE-II

SUMMARY OF STATIONARY CALIBRATION (FERTILIZER)

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	10	11	12	13	14	15			Min	Max
3	Full	Max.	300	310	315	305	320	360	340	350	360	375	360	355	365	375	380	470.00	517.00	0.88	1.12
		Med.	200	240	210	215	245	260	265	255	260	230	240	245	250	255	240	328.18	361.00	0.86	1.14
		Min.																-			
	¾	Max.	320	330	310	315	325	320	360	370	340	345	325	310	325	360	345	454.55	500.00	0.91	1.09
		Med.	190	200	215	200	205	190	185	160	175	190	180	175	160	175	200	254.55	280.00	0.85	1.15
		Min.																-			
	½	Max.	320	315	330	310	315	325	320	330	340	310	315	325	310	340	350	441.36	485.50	0.94	1.06
		Med.	190	160	180	190	185	165	175	180	175	160	190	195	200	205	215	251.36	276.50	0.85	1.15
		Min.																-			
	¼	Max.	300	315	305	315	310	315	310	345	340	360	365	390	320	830	340	496.36	546.00	0.53	1.47
		Med.	200	210	190	180	190	190	185	160	175	190	175	160	190	180	170	249.55	274.50	0.86	1.14
		Min.																-			
5	Full	Max.	400	415	405	400	410	430	450	400	400	450	410	445	420	430	410	570.45	627.50	0.94	1.06
		Med.	200	290	300	210	260	275	260	300	310	315	300	200	190	180	220	346.36	381.00	0.73	1.27
		Min.																-			
	¾	Max.	420	410	415	410	405	400	415	410	415	400	400	390	380	390	400	550.91	606.00	0.95	1.05
		Med.	230	240	250	210	200	250	260	210	300	310	300	290	300	310	310	360.91	397.00	0.78	1.22
		Min.																-			
	½	Max.	400	390	380	390	400	390	360	380	360	390	400	410	405	408	409	533.82	587.20	0.94	1.06
		Med.	200	210	215	225	230	240	245	300	3610	290	280	265	280	290	265	649.55	714.50	0.10	1.90
		Min.																-			
	¼	Max.	400	420	410	405	400	400	390	380	400	405	390	380	350	390	400	538.18	592.00	0.91	1.09
		Med.	230	240	245	240	265	255	260	290	300	305	300	260	2365	270	280	555.00	610.50	0.18	1.82
		Min.																-			

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ANNEXURE-III

SUMMARY OF MECHANICAL DAMAGE TEST (WHEAT)

Forward speed (kmph)	Rate setting	Mechanical damage from disc type furrow openers (%)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.0	Recommended	0.18	0.16	0.18	0.16	0.20	0.22	0.18	0.16	0.20	0.24	0.16	0.20	0.22	0.24	0.16
	rate setting for field	0.20	0.18	0.21	0.21	0.16	0.16	0.21	0.18	0.18	0.18	0.18	0.16	0.20	0.18	0.20
		0.19	0.22	0.17	0.20	0.18	0.17	0.20	0.17	0.22	0.20	0.19	0.21	0.16	0.20	0.18
	Average	0.190	0.186	0.187	0.190	0.180	0.183	0.210	0.170	0.200	0.206	0.176	0.190	0.193	0.206	0.180
5.0	Recommended rate setting for field	0.21	0.18	0.17	0.20	0.18	0.19	0.18	0.18	0.20	0.16	0.21	0.19	0.18	0.19	0.20
		0.20	0.24	0.22	0.18	0.22	0.21	0.16	0.16	0.18	0.18	0.18	0.22	0.22	0.21	0.21
		0.22	0.24	0.18	0.19	0.24	0.20	0.24	0.19	0.18	0.17	0.18	0.20	0.24	0.22	0.24
	Average	0.210	0.220	0.190	0.190	0.213	0.200	0.193	0.176	0.186	0.170	0.190	0.203	0.213	0.206	0.216

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ANNEXURE-IV

SUMMARY OF FIELD TEST (WHEAT SOWING)

Place of test : Afzalgarn Dist-Bijnor (U.P)

Tractor used : JHON DEERE-5310 V6

Gear Used : L-2

Soil moisture,% : 16 to 22.9

S.No.	Test Number	1	2	3	4	5	6
1.	Date of test	26-02-2021	27-02-2021	28-02-2021	01-03-2021	02-03-2021	03-03-2021
2.	Duration of test ,h	4.5	2.0	5.0	5.0	5.5	3.0
3.	Variety of seed	HD-226 (Wheat)					
4.	Av. Forward speed, kmph	3.15	3.19	3.14	3.13	3.12	3.26
5.	Av. Wheel slip ,%	5.27	4.97	5.33	5.43	5.57	4.53
6.	Fuel consumption- l/h. l/hac	 6.000 8.820	 5.950 8.449	 6.190 9.718	 6.230 9.656	 6.400 10.433	 5.800 8.062
7.	Av. Depth of sowing of Seed & Fertilizer, cm S R	7.9 8.43	7.77 8.17	7.7 8.0	8.13 8.47	7.83 8.20	7.17 7.67
8.	Seed rate setting, kg/ha	213.18 to 384.50					
9.	Fertilizer rate setting, kg/ha	249.55 to 361					
10.	Field capacity ,ha/h	0.681	0.703	0.636	0.646	0.612	0.720

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11.	Field efficiency ,%	80.68	81.93	75.00	76.72	72.68	81.82
12.	Time required for one hectare (h)	1.47	1.42	1.57	1.55	1.63	1.39
13.	Av. Weight of stubble before use of seeder, kg/m²	1.920	1.510	0.980	2.250	2.430	0.950
15.	Stubble height before use of seeder,cm	12.0-35.0	11.8-30.0	8-20.5	15.0-35.4	10.0-38.0	9.0-18.5
16.	Av. Draft, kgf	618	605	616	619	620	630
17.	Av. working width (m)	2.68	2.69	2.70	2.69	2.70	2.71

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ANNEXURE-V

SUMMARY OF UNIFORMITY TEST (DATA SHEET)

Rate setting	Parameter	Furrow openers															Average	Variation from mean (%)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Recommended for seed sowing	No. of seeds dropped per meter of row length	25	30	30	40	30	32	30	25	35	30	25	35	34	30	26		
		28	24	26	30	26	30	35	30	32	30	30	32	32	30	30		
		24	32	28	35	30	28	38	28	40	29	28	25	28	28	26		
	Av.	25.67	28.67	28.00	35.00	28.67	30.00	34.33	27.67	35.67	29.67	27.67	30.00	29.00	30.00	27.33	31.80	0.84-1.16
--do--	Av. Distance between two seeds (mm)	6	0		3	0	2	3	0	3	5	3	3	0	2	3		
		4	5	4	8	6	4	5	4	0	4	5	6	6	4	6		
		3	7	7	3	5	6	4	5	4	5	5	5	4	3	6		
	Av.	4.33	4.00	4.67	3.67	4.33	4.33	3.00	4.00	3.00	4.00	4.33	3.67	4.00	4.00	3.67	4.2	0.78-1.21

ANNEXURE -VI

BRIEF SPECIFICATIONS OF THE TRACTOR USED DURING FIELD TEST

1	Make, model and type	JHON DEERE-5310 V6 Agriculture tractor
2	Number of cylinders	03
3	Maximum PTO power, Kw	36.4
4	Power at standard Power Take-Off speed, 540± 10 rpm, Kw	49.5
5	Rated engine speed, rpm	2100
6	No load engine speed during field test, rpm	1800
7	Drawbar power, Kw	37.3
8	**Drawbar pull, kN :**	
	- Without ballast	22.93
	- With ballast	17.70
9	Type of wheel equipment	Pneumatic
10	**Number & size of tyre :**	
	Front	02; 11.2-24-8PR
	Rear	02; 16.9-28-12PR
11	Standard track width, mm :	
	- Front	1315
	- Rear	1420
12	Wheel base, mm	2050
13	Ballast condition	un -ballast
14	**Total Operational Mass, kg :**	
	- Front	680
	- Rear	1150
	- Total	1830

ANNEXURE -VII

SYMBOL AND ABBREVIATIONS

SYMBOLS:

I-	**SYMBOLS ASSIGNED TO BASIC SI UNITS**		
S.N.	**PHYSICAL QUANTITY**	**NAME OF SI UNIT**	**SYMBOL**
1	Length	Meter	m
		Millimetre	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 centimetre	cm^2
		Square meter	m^2
		Hectare	ha
2	Speed/Velocity	Meter per second	m/s
		Kilometre per hour	kmph
3	Pressure	Newton per square millimetre	N/mm^2
4	Time	Minute	min
		Hour	h
5	Volume	Cubic centimetre	cm^3
		Millilitre	ml
		Litter	l

ABBREVIATIONS:

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