SHAKTIMAN SQUARE FERTILIZER BROADCASTER “SSFB-400”

Department of Farm Machinery and Power Engineering
College of Agricultural Engineering and Technology
CCS Haryana Agricultural University
Hisar-125 004
Telephone: 01662-284313
Website: www.hau.ernet.in
E-mail: fpm@hau.ernet.in

(The College of Agricultural Engineering and Technology, CCSHAU, Hisar is an 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)
COMMERCIAL TEST REPORT

of

SHAKTIMAN SQUARE FERTILIZER BROADCASTER
“SSFB-400”

Test requested by

M/s. Tirth Agro Technology Pvt. Ltd.,
Near Hotel Krishna Park, NH-27,
Gondal Road, Vavdi
Distt. Rajkot – 360004
Gujarat

Department of Farm Machinery and Power Engineering
College of Agricultural Engineering and Technology
CCS Haryana Agricultural University
Hisar-125 004
<table>
<thead>
<tr>
<th><strong>TYPE OF TEST</strong></th>
<th>COMMERCIAL</th>
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</thead>
<tbody>
<tr>
<td><strong>TEST REPORT NO.</strong></td>
<td>HAU/FMPE/17-18/Fer. Broad-02</td>
</tr>
<tr>
<td><strong>REPORT RELEASED IN</strong></td>
<td>February, 2018</td>
</tr>
<tr>
<td><strong>TYPE OF MACHINE</strong></td>
<td>Tractor Operated Fertilizer Broadcaster</td>
</tr>
<tr>
<td><strong>TEST REQUESTED BY</strong></td>
<td>M/s. Tirth Agro Technology Pvt. Ltd., Near Hotel Krishna Park, NH-27, Gondal Road, Vavdi Distt. Rajkot – 360004 Gujarat</td>
</tr>
<tr>
<td><strong>TEST CONDUCTED BY</strong></td>
<td>Department of Farm Machinery and Power Engineering College of Agricultural Engineering and Technology CCS Haryana Agricultural University, Hisar</td>
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Type of test : COMMERCIAL (ICT)

Test Code/procedure : IS: 4468-1997 (Part-I),
                     IS: 4931-1995,
                     IS: 12337-1988

Period of test : March to February, 2018

Test Report No. : HAU/FMPE/17-18/Fer. Broad-02

Month & Year : February, 2018

                        (NRFMT&TI, Hisar)

**Important Instructions**

- The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.

- The data given in this report pertains to the particular machine submitted by the applicant for test.

- The results presented in this report do not in any way attribute to durability of the machine.

- The report should not be reproduced in part or full without prior permission of Department of Farm Machinery and Power Engineering, CCSHAU, Hisar

**SELECTED CONVERSIONS**

1. **Force**
   1 kgf = 9.80665 N
           = 2.20462 lbf

2. **Power**
   1 HP = 1.01387 Metric HP (Ps)
          = 745.7 W
          = 735.5 W

3. **Pressure**
   1 psi = 6.895 kPa
           = 98.067 kPa = 735.56 mm of Hg
   1 kgf/sq. cm = 100 kPa = 10 N/ sq. cm.
   1 bar = 1.3333 m-bar
   1 mm of Hg
<table>
<thead>
<tr>
<th></th>
<th>CONTENTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scope of test</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Test procedure</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Method of selection</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Brief description of equipment</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Specifications</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Running-in</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>Field performance test</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Lubrication &amp; servicing</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>Ease of operation and adjustments</td>
<td>11</td>
</tr>
<tr>
<td>10</td>
<td>Soundness of Construction</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>Comments and Recommendations</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Literature</td>
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<td>13</td>
<td>Applicants comments</td>
<td>12</td>
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<tr>
<td></td>
<td>ANNEXURE- I-V</td>
<td></td>
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</table>
1. SCOPE OF TEST

The scope of test was to check and assess the following:

1.1 Specification of Fertilizer Broadcaster;
1.2 Field tests to evaluate the suitability of machine with regard to:
   - Quality of work
   - Rate of work
   - Labour requirement
   - Power requirement
   - Ease of operation and adjustment

2. TEST PROCEDURE

The following test codes were followed to test the machine as there is no specific
BIS code for testing of fertilizer broadcaster

i. IS: 4468-1997 (Part-1) (Reaffirmed 2012); Agricultural wheeled tractors-Rear
   mounted three point linkage: Part 1 Categories 1, 2, 3, & 4

ii. IS: 4931-1995 (Reaffirmed 2009); Agricultural tractors-Rear mounted power
    take off types 1, 2 and 3

iii. IS:12337-1988 (Reaffirmed 2009); Specifications of manually operated fertilizer
     broadcaster

3. METHOD OF SELECTION

The machine was directly submitted for test by the applicant to the Institute. Thus, the
method of selection is not known.

4. BRIEF DESCRIPTION OF EQUIPMENT

Machine is mounted by three point linkage on tractor and powered by tractor PTO shaft.
Machine is designed to work at 540 PTO rpm. Propeller shaft of machine receives
power from tractor PTO shaft. Power is transmitted to spreading disk and agitator
through a gearbox. Five setting are provided to control fertilizer rate as well as to control
spreading direction. The machine is designed to spread fertilizer in either LHS on RHS
direction from the centre line of travel. The machine can also broadcast the fertilizer
simultaneously in LHS & RHS direction. The machine requires the fallow land having
width equal to tractor track width for operation in field.
5. SPECIFICATIONS

5.1. GENERAL
   State: Gujarat, India        PIN: 360311
2. Name of Implement : Tractor Operated Fertilizer Broadcaster
3. Type of test conducted : Field test using DAP
4. Make : SHAKTIMAN
5. Model : SSFB-400
6. Serial No. : 16J10007
7. Weight : 120 kg
8. Suitability of machine : Fertilizer and seed broadcasting
9. Capacity of hopper : 400 kg (306.67 litres)

5.2. PRIME MOVER USED
1. Tractor : New Holland - 4010
2. Chassis No. / Engine No. : 6189407/S-325D37105
4. Max. PTO Power Kw : 24.1
5. Engine speed recommended for field test, rpm (apa) : 1700

5.3. CHASSIS
1. Type of frame : MS pipe (square)
2. Size of pipe, mm : 60 × 60

5.4. POWER TRANSMISSION SYSTEM
1. Method of transmission : Power input shaft receives drive from tractor PTO shaft and transmits power to gearbox which in turn rotates the fertilizer distributing plate.

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5.4.1. Three point linkage (Refer Fig.1)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Component</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>As per IS: 4468-1997 (part-1), mm</td>
<td>As measured , mm</td>
</tr>
<tr>
<td>1.</td>
<td>Upper hitch point (Cat-II)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Diameter of hitch pin hole ($d_1$)</td>
<td>25.7±0.2</td>
<td>25.80</td>
</tr>
<tr>
<td>b)</td>
<td>Width between inner face of yoke ($b'_{1}$)</td>
<td>52.0 (min.)</td>
<td>58.0</td>
</tr>
<tr>
<td>c)</td>
<td>Width between outer face of yoke ($b'_{2}$)</td>
<td>86.0 (max.)</td>
<td>79.1</td>
</tr>
<tr>
<td>2.</td>
<td>Lower hitch points (Cat-II)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Diameter of hitch pin ($D_2$)</td>
<td>28.0 – 0.2</td>
<td>27.90</td>
</tr>
<tr>
<td></td>
<td>Diameter of hole</td>
<td>28.70 to 29.00</td>
<td>28.70</td>
</tr>
<tr>
<td>c)</td>
<td>Linch pin hole distance ($b'_{3}$)</td>
<td>49 (Min)</td>
<td>128.0</td>
</tr>
<tr>
<td>3.</td>
<td>Diameter of linch pin hole for Cat-I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Upper hitch pin (d)</td>
<td>12 (min)</td>
<td>12</td>
</tr>
<tr>
<td>b)</td>
<td>Lower hitch pin (d)</td>
<td>12 (min)</td>
<td>12</td>
</tr>
<tr>
<td>4.</td>
<td>Mast height (h)</td>
<td>$610 \pm 1.5$ or more in the range of $810 \pm 1.5$</td>
<td>580</td>
</tr>
<tr>
<td>5.</td>
<td>Lower hitch point span (l)</td>
<td>$825 \pm 1.5$ or lesser up to 683 mm</td>
<td>655</td>
</tr>
</tbody>
</table>

* 2 out of 9 (22.2 %) dimensions are not conforming to BIS requirement.
Fig. 1: Dimensions of three point linkage as per IS 4468:1997 (Part-1)
5.4.2. Mast

1. Type M. S. pipe fabrication
2. Size of pipe, mm 60
3. Method of mounting The upper and lower hitch points are mounted on the MS pipe fabrication which acts as base frame.

5.4.3. Dimensions of power input shaft of fertilizer broadcaster (Ref. Fig. 2)

<table>
<thead>
<tr>
<th>Notation</th>
<th>As per IS: 4931-1995, mm</th>
<th>As observed, mm</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>54.0 (min)</td>
<td>64</td>
<td>Conforms</td>
</tr>
<tr>
<td>B</td>
<td>76.0 (min)</td>
<td>76.3</td>
<td>Conforms</td>
</tr>
<tr>
<td>Df</td>
<td>34.79 ± 0.06</td>
<td>34.84</td>
<td>Conforms</td>
</tr>
<tr>
<td>df</td>
<td>28.91 ± 0.05</td>
<td>28.90</td>
<td>Conforms</td>
</tr>
<tr>
<td>G</td>
<td>7.0</td>
<td>8.0</td>
<td>Conforms</td>
</tr>
<tr>
<td>H</td>
<td>38.0</td>
<td>40.0</td>
<td>Conforms</td>
</tr>
<tr>
<td>I</td>
<td>25.0 ± 0.5</td>
<td>N.A</td>
<td>--</td>
</tr>
<tr>
<td>J</td>
<td>78.3</td>
<td>N.A</td>
<td>--</td>
</tr>
<tr>
<td>R</td>
<td>6.7 ± 0.25</td>
<td>6.7</td>
<td>Conforms</td>
</tr>
<tr>
<td>S</td>
<td>8.69</td>
<td>8.69</td>
<td>Conforms</td>
</tr>
<tr>
<td>?</td>
<td>30°</td>
<td>30°</td>
<td>Conforms</td>
</tr>
</tbody>
</table>

5.4.4 Propeller shaft

1. Type Telescopic (in two segments with universal joint having 6 splined hub at both ends.)

2. Length of shaft, mm
   Minimum 855
   Maximum 1103

3. Mass of shaft, kg 6744

4. Provision for locking Provided
SPLINED END PINION SHAFT DIMENSIONS (mm)

PROPELLER SHAFT INSERT DIMENSIONS, (mm)

Fig. 2: Dimensions of power input shaft & propeller shaft hub as per IS 4931:1995

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CCS HARYANA AGRICULTURAL UNIVERSITY, HISAR
5.4.4.1. Propeller shaft hub dimensions (Ref. Fig; 2):

<table>
<thead>
<tr>
<th>Notation</th>
<th>As per IS:4931-1995, mm</th>
<th>As observed, mm</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Df</td>
<td>34.93 ± 0.03</td>
<td>34.90</td>
<td>Conforms</td>
</tr>
<tr>
<td>df</td>
<td>29.7 ± 0.1</td>
<td>29.60</td>
<td>Conforms</td>
</tr>
<tr>
<td>W</td>
<td>8.69 (min)</td>
<td>8.71</td>
<td>Conforms</td>
</tr>
<tr>
<td>B</td>
<td>54 (Min)</td>
<td>54</td>
<td>Conforms</td>
</tr>
</tbody>
</table>

5.4.5 Gear box Assembly
1. Type : Bevel pinion gear
2. No. of teeth on pinion : 17
3. No. of teeth on bevel gear : 17
4. Reduction ratio : 1:1
5. Grease capacity, g : 300
6. Grease change period, h (apa) : Every 100 working hours
7. Recommended grade of grease (apa) : Lithium Base Grease
8. No. of bearings : Two ball bearing (6205 2RS) on output shaft and Two ball bearing (6205 2Rs) on Input shaft

5.5. Hopper
1. Type : Square shaped fabricated by MS sheet
2. Size of MS sheet, mm : 2.0
3. Capacity : 400 kg (306.67 litres)
4. Size of hopper at top, mm : 1200 × 900
5. Size of hopper at bottom, mm : 180 × 180
6. Height of hopper, mm : 860
7. Loading height of hopper, mm : 1193
8. Metering mechanism and method of changing feed rate : Apertures are provided at the bottom of the hopper whose opening is adjusted by sliding shutters
9. Metering mechanism indexing lever : The sliding shutters of opertures are opened by a lever which is mounted on indexing plate. The indexing plate has eight holes. (Ref. Fig. 3)
10. Number of apertures : 3
11. Dimension of aperture (length × width), mm : 54×48, 22
12. Dia. of indexing plate rod : 10 mm
13. Length of indexing plate rod : 160 mm

Fig. 3: A view of indexing plate

5.6. Fertilizer distributor

1. Type of fertilizer distributor : Circular MS disc having four 'C' shaped vanes
2. Number of discs : 1
3. Diameter of disc, mm : 432.2
4. Number of distributor vane : 4
5. Length of blade, m : 190
6. Height of blade, mm : 30
7. Angle of blades, degrees : $0^\circ, 22^\circ, 33^\circ, 44^\circ$
8. Method of changing the angle of blades : By fixing nut and bolt on the holes provided for the purpose.
5.7 Overall Dimensions, mm

The overall dimensions are given in Fig.4.

1. Length, mm : 1020
2. Width, mm : 1200
3. Height, mm : 1195
4. Weight, kg : 120

L = 1020 mm  W = 1200 mm  H = 1195 mm

Fig. 4. Dimensions of Shaktiman Square Fertilizer Broadcaster "SSFB-400"

6. RUNNING-IN

The fertilizer broadcaster was run-in for one hour. Bolts and nuts were tightened and lubrication was done before the start of the actual test.
7. FIELD PERFORMANCE TEST

Field test of fertilizer broadcaster was conducted at RDS Farm, CCS HAU (Haryana) for 20.5 hours consisting of 5 trials. The implement was used for broadcasting DAP fertilizer. New Holland 4010 tractor was used. The detailed test results are given in Annexure-II and are summarized as under:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Parameters</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Field condition</td>
<td>Levelled field</td>
</tr>
<tr>
<td>2.</td>
<td>Speed of field operation, km/h</td>
<td>3.03 to 3.12</td>
</tr>
<tr>
<td>3.</td>
<td>Total fertilizer spreading width, m</td>
<td>13.78 to 13.91</td>
</tr>
<tr>
<td>4.</td>
<td>Fertilizer application rate, kg/ha</td>
<td>109 to 120</td>
</tr>
<tr>
<td>5.</td>
<td>Uniformity Coefficient</td>
<td>54.6 to 59.2</td>
</tr>
<tr>
<td>6.</td>
<td>Actual field capacity, ha/h</td>
<td>3.16 to 3.46</td>
</tr>
<tr>
<td>7.</td>
<td>Field efficiency, %</td>
<td>77.34 to 81.97</td>
</tr>
<tr>
<td>8.</td>
<td>Fuel consumption, l/h</td>
<td>3.17 to 3.69</td>
</tr>
<tr>
<td>9.</td>
<td>Fuel consumption, l/ha</td>
<td>0.97 to 1.13</td>
</tr>
<tr>
<td>10.</td>
<td>PTO power requirement, hp</td>
<td>5.8 to 6.4</td>
</tr>
</tbody>
</table>

7.1 Quality of work

- The average forward speed was observed to be from 3.03 to 3.12 kmph.
- The uniformity coefficient which indicates the evenness of spreading of fertilizer was observed to be in the range of 54.6 to 59.2%

7.2 Rate of work and fuel consumption

The average width of spreading of fertilizer was observed as 13.78 to 13.91 m. The area covered was 3.16 to 3.46 ha/ h and fuel consumption varied from 3.17 to 3.69 l/h or 0.97 to 1.13 l/ha. The fertilizer application rate was in the range of 109 to 120 kg/ha.

7.3 Field efficiency and labour requirement

Field efficiency of machine was observed from 77.34 to 81.97 %. Only one person (Driver) is required to operate the tractor.

8. LUBRICATION & SERVICING

All lubrication points were lubricated/greased daily before starting the operation.
9. EASE OF OPERATION AND ADJUSTMENT

9.1 The drive shaft (universal coupling shaft) is provided with shear bolt for safety.

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

9.3 The operation and adjustment of fertilizer broadcaster was observed to be satisfactory.

9.4 Operator comfort: The equipment was easy for handling of operator.

9.5 Ease of loading: The loading height has been found to be satisfactory.

9.6 Ease of setting delivery rates: The sliding shutter and lever arrangement is available on machine. The machine has to be calibrated before getting desired fertilizer rate.

9.7 Ease of cleaning machine and components: No complicated components are available in machine, hence the cleaning is easy.

10. SOUNDNESS OF CONSTRUCTION

No breakdown was observed during 20.5 hrs. of operation of fertilizer broadcaster.

II. COMMENTS AND RECOMMENDATIONS

11.1 Some dimensions of three point linkage of the implement do not conform to IS: 4468-1997 (Part-1). This should be incorporated at production level.

11.2 The propeller shaft is provided with shearing bolt for safety of the machine.

11.3 Maneuverability of tractor with fertilizer broadcaster and quality of work were observed to be satisfactory.

11.4 Dimensions of input shaft of machine conforms to IS: 4931-1995.

11.5 The machine is provided with minimum cautionary notices for guidance as well as to ensure safety of operator.

11.6 The PTO power requirement of fertilizer broadcaster was observed from 5.8 to 6.4 hp.

11.7 The spreading chart of different types of seeds and fertilizer at different speed of tractor and gate settings of shutter along with application rate is given which is fixed on the machine for ready reference by the users.
12. LITERATURE

Instruction manual & spare parts list in English is provided with the machine. However, the manufacture should also develop these manuals in Hindi and other regional languages as per IS: 8132-1999 for the guidance of users and technical personnel.

13. APPLICANTS COMMENTS

1. We will take necessary action for dimension of implement hitch as per IS: 4468 (Pt-I)-1997 (Reaffirmed in 2012).
2. We will take necessary action for provide product literature in other vernacular language as per IS 8132-1999

TESTING AUTHORITY

<table>
<thead>
<tr>
<th>(Er. MUKESH JAIN) Principal Investigator</th>
<th>(Dr. VIJAYA RANI) Co-Principal Investigator cum Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Farm Machinery and Power Engineering</td>
<td></td>
</tr>
<tr>
<td>College of Agricultural Engineering and Technology</td>
<td></td>
</tr>
<tr>
<td>CCS Haryana Agricultural University</td>
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</tr>
</tbody>
</table>

Test data collected and compiled by Er. Manoj
Annexure -I

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

<p>| | | |</p>
<table>
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<tbody>
<tr>
<td>1</td>
<td>Name of the tractor (Make)</td>
<td>NEW HOLLAND</td>
</tr>
<tr>
<td>2</td>
<td>Model</td>
<td>4010</td>
</tr>
<tr>
<td>3</td>
<td>Name of owner</td>
<td>CCSHAU, Hisar</td>
</tr>
<tr>
<td>4</td>
<td>Name of operator</td>
<td>Sh. Harish</td>
</tr>
<tr>
<td>5</td>
<td>Engine No./ Chassis No.</td>
<td>6189407/S-325D37105</td>
</tr>
<tr>
<td>6</td>
<td>Number of cylinders</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Power at standard PTO speed, kW</td>
<td>24.1</td>
</tr>
<tr>
<td>8</td>
<td>Rated engine speed, rpm</td>
<td>2000</td>
</tr>
<tr>
<td>9</td>
<td>No load engine speed during field test (rpm)</td>
<td>1700</td>
</tr>
<tr>
<td>10</td>
<td>Drawbar power kW</td>
<td>21.3</td>
</tr>
<tr>
<td>11</td>
<td>Drawbar pull (kN):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Without ballast</td>
<td>13.4</td>
</tr>
<tr>
<td></td>
<td>• With ballast</td>
<td>20.2</td>
</tr>
<tr>
<td>12</td>
<td>Number &amp; size of tyre:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Front</td>
<td>Two, 6.00 - 16.0/8PR</td>
</tr>
<tr>
<td></td>
<td>• Rear</td>
<td>Two, 12.4 - 28.0/PR</td>
</tr>
<tr>
<td>13</td>
<td>Standard track width (mm):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Front</td>
<td>1310</td>
</tr>
<tr>
<td></td>
<td>• Rear</td>
<td>1340</td>
</tr>
<tr>
<td>14</td>
<td>Wheel base (mm)</td>
<td>1865</td>
</tr>
<tr>
<td>15</td>
<td>Ballast condition</td>
<td>Used in unballasted condition</td>
</tr>
<tr>
<td>16</td>
<td>Total Operational Mass (kg):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Front</td>
<td>740</td>
</tr>
<tr>
<td></td>
<td>• Rear</td>
<td>1060</td>
</tr>
<tr>
<td></td>
<td>• Total</td>
<td></td>
</tr>
</tbody>
</table>
Field performance of Shaktiman Square fertilizer broadcaster (SSFB-400)

Place of Test : RDS Farm, CCSHAU, Hisar  
Tractor used : New Holland - 4010  
Gear used : L-2  
Fertilizer used : DAP

<table>
<thead>
<tr>
<th>Test</th>
<th>Date</th>
<th>Duration, h</th>
<th>Speed of tractor, km/h</th>
<th>PTO RPM</th>
<th>Operture shutter opening position*</th>
<th>Angle of blades of distributor plate**</th>
<th>Total fertilizer spreading width, m</th>
<th>Fertilizer application rate, kg/ha</th>
<th>Uniformity coefficient</th>
<th>Actual field capacity, ha/h</th>
<th>Field efficiency, %</th>
<th>Fuel consumption, l/h</th>
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*Operture shutter opening position: 15 holes are given on the Indexing lever. Hole No.1. hole opens the shutter to minimum and Hole No.15 opens the shutter to maximum.

**There are four angles of blades of distributor plate. The angles are $0^0$ (min.), $22^0$ (Medium), $33^0$ (Maximum), $44^0$ (Top)
### Laboratory test: Variation in fertilizer distribution

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### Annexure III

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<th>Date</th>
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<th>Fertilizer Rate (kg/ha)</th>
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**DEPARTMENT OF FARM MACHINERY AND POWER ENGINEERING**

**CCS HARYANA AGRICULTURAL UNIVERSITY, HISAR**
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Angle of fertilizer distributor plate on fertilizer spreading width, m</th>
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*Operation shutter opening position: 15 holes are given on the indexing lever. Hole No.1-1 hole opens the shutter to minimum and Hole No.15 opens the shutter to maximum.*
Annexure-V

Spreading chart for Fertilizer (As given on machine)

Seed norm ratio (kg./hectre) for different options and running
Speeds of the fertilizer machine with different disc

| Tractor PTO | : 540d/d | Tripple super phosphate width | : 13.75 m |
| Disk height from floor | : 70 cm | Urea | : 13.25 m |

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A = Left Hand Side discharge opening
B = Right Hand Side discharge opening
Fig. 5: Fertilizer Broadcaster being used for broadcasting DAP