COMMERCIAL TEST REPORT

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No.: IMP-874/2086/2017

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COMMERCIAL TEST REPORT
6.6 Seeding Uniformity
The seeding uniformity test was conducted on well-prepared sand bed of 5 m lengths and the width is equal to that of implement’s width. The seed cum fertilizer drill was operated over this bed with seed tube very near to the top surface of the bed. The data on number of seeds dropped, average distances between two seeds and the deviation of seed dropped from centerline were recorded. The results 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>Avg. number of seeds per meter of row length</td>
<td>50.8 to 57.4</td>
</tr>
<tr>
<td>2</td>
<td>Avg. spacing between seeds (cm)</td>
<td>1.69 to 2.01</td>
</tr>
<tr>
<td>3</td>
<td>Deviation of seed from center line (mm)</td>
<td>7.9 to 11.0</td>
</tr>
</tbody>
</table>

6.7 Hardness: The surface hardness of furrow opener was recorded as under:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Hardness as per IS: 6813-2000 (HB)</th>
<th>Hardness as observed, HB (Hardened zone is not separately provided on furrow opener)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>350 to 450</td>
<td>475 to 500</td>
<td>Does not conform</td>
</tr>
</tbody>
</table>

6.8 Chemical Composition
A piece of furrow opener was got analyzed for chemical composition. The results of chemical analysis which is given below:

<table>
<thead>
<tr>
<th>Constituents</th>
<th>As per IS: 6690-1981</th>
<th>Composition As observed (% of weight)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Carbon Steel</td>
<td>Silicon Manganese Steel</td>
<td></td>
</tr>
<tr>
<td>Carbon (C)</td>
<td>0.70-0.85</td>
<td>0.50 to 0.60</td>
<td>0.6957</td>
</tr>
<tr>
<td>Silicon (Si)</td>
<td>0.10-0.40</td>
<td>1.5 to 2.00</td>
<td>0.8017</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>0.50-1.0</td>
<td>0.50 to 1.0</td>
<td>0.6882</td>
</tr>
<tr>
<td>Sulphur (S)</td>
<td>0.5(Max)</td>
<td>0.5(Max)</td>
<td>0.0345</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>0.5(Max)</td>
<td>0.5(Max)</td>
<td>0.0296</td>
</tr>
</tbody>
</table>

7. FIELD PERFORMANCE TEST
The New Swan Multitech Ltd. ZSTD-11 Zero Till Seed Cum Fertilizer Drill was operated for 26.05 hours for sowing of Wheat seed & SSP fertilizer under varying soil and moisture condition in well-prepared seedbed. Total four test trials were conducted (refer Annexure-XIII).

The tractor Swaraj 855 FE was used during the test and reported data are summarized in ensuing table.

**Table: Summary of field performance results:**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Parameters</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type of soil</td>
<td>Sandy loam</td>
</tr>
<tr>
<td>2</td>
<td>Soil moisture (%)</td>
<td>16.9 to 20.2</td>
</tr>
<tr>
<td>3</td>
<td>Gear used of tractor</td>
<td>L-3</td>
</tr>
<tr>
<td>4</td>
<td>Avg. speed of travel (km/h)</td>
<td>4.0 to 4.30</td>
</tr>
<tr>
<td>5</td>
<td>Avg. Wheel slip (%)</td>
<td>1.49 to 3.25</td>
</tr>
<tr>
<td>6</td>
<td>Variety of crop</td>
<td>HD 2967</td>
</tr>
<tr>
<td>7</td>
<td>Avg. depth (cm)</td>
<td>4.15 to 4.23 for Seed, 4.24 to 4.36 for Fertilizer</td>
</tr>
<tr>
<td>8</td>
<td>Avg. seed spacing (cm)</td>
<td>1.69 to 2.01</td>
</tr>
<tr>
<td>9</td>
<td>Avg. number of seeds per meter of row length</td>
<td>51 to 57</td>
</tr>
<tr>
<td>10</td>
<td>Deviation of seed (mm)</td>
<td>7.9 to 11</td>
</tr>
<tr>
<td>11</td>
<td>Avg. working width (cm)</td>
<td>188 to 189</td>
</tr>
<tr>
<td>12</td>
<td>Area covered (ha/h)</td>
<td>0.596 to 0.674</td>
</tr>
<tr>
<td>13</td>
<td>Time required for one ha (h)</td>
<td>1.48 to 1.67</td>
</tr>
<tr>
<td>14</td>
<td>Seed rate (kg/ha)</td>
<td>132.4 to 135.9</td>
</tr>
<tr>
<td>15</td>
<td>Fertilizer rate (kg/ha)</td>
<td>125.03 to 139.2</td>
</tr>
<tr>
<td>16</td>
<td>Field efficiency (%)</td>
<td>79.3 to 83.4</td>
</tr>
<tr>
<td>17</td>
<td>Avg. draft (kN)</td>
<td>4.65</td>
</tr>
<tr>
<td>18</td>
<td>Avg. power requirement (kW)</td>
<td>5.45</td>
</tr>
<tr>
<td>19</td>
<td>Fuel consumption</td>
<td></td>
</tr>
<tr>
<td></td>
<td>l/h</td>
<td>2.85 to 3.0</td>
</tr>
<tr>
<td></td>
<td>l/ha</td>
<td>4.16 to 5.04</td>
</tr>
</tbody>
</table>

7.1 Rate of work
- The average area covered was recorded as 0.596 to 0.674 ha/h at average operating speed 4.0 to 4.30 km/h.
- The field efficiency of seed cum fertilizer drill was recorded as 79.3 to 83.4%.

7.2 Quality of work
- The average depth of sowing the seed was recorded as 4.15 to 4.23 cm.
- The average depth of placing the fertilizer was recorded as 4.24 to 4.36 cm.
- The average number of seeds per meter row length was recorded as 50.8 to 57.4.
- The average spacing between seeds was recorded as 1.69 to 2.01 cm.
- The deviation of seed from centre line was observed as 7.9 to 11.0 mm.

7.3 Metering rate
7.3.1 Wheat
The seed rate of Wheat was recorded 132.4 to 135.9 kg/ha.

7.3.3 Fertilizer
The fertilizer rate of was recorded 125.03 to 139.2 kg/ha.

7.4 Power requirement
7.4.1 The average draft observed during wheat sowing was 4.65 kN.
7.4.2 The power requirement during wheat sowing was 5.45 kW.

7.5 Rate of wear on mass basis (for 26.05 hours of field operation):

<table>
<thead>
<tr>
<th>Furrow opener No</th>
<th>Initial Mass (g)</th>
<th>Final Mass (g) after 26.05 h</th>
<th>Percent Wear (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loss of mass (g) after 25.19 h</td>
<td>Percent (Wear)</td>
<td>Wear Per hour</td>
</tr>
<tr>
<td>1</td>
<td>6364.6</td>
<td>6348.2</td>
<td>16.4</td>
</tr>
<tr>
<td>2</td>
<td>6069.9</td>
<td>6049.0</td>
<td>20.9</td>
</tr>
<tr>
<td>3</td>
<td>6248.3</td>
<td>6227.3</td>
<td>21.0</td>
</tr>
<tr>
<td>4</td>
<td>6204.4</td>
<td>6186.1</td>
<td>18.3</td>
</tr>
<tr>
<td>5</td>
<td>6419.6</td>
<td>6404.1</td>
<td>15.5</td>
</tr>
<tr>
<td>6</td>
<td>6166.1</td>
<td>6147.0</td>
<td>19.0</td>
</tr>
</tbody>
</table>

Remark: The hourly rate of wear on mass basis was observed as 0.01%.
| Cl 8.7.1 | The thickness of plastic tube shall of 2.5 mm minimum. | 2.6 mm | Conforms |
| Cl 8.8 | METERING MECHANISM | | |
| 8.8.1 | The seed metering mechanism components of fluted feed roller and plate type shall be in conformity to the requirements given in Annex C of IS. Other type of seed metering mechanism may also be used. | Fluted roller type mechanism (type 3), but the dimensions do not conform to the requirements given in the IS 6813:2000 | Does not conform in toto |
| 8.8.2 | The fertilizer metering mechanism components of fluted feed roller and plate type shall be in conformity to the requirements given in Annex D of IS. Other type of Fertilizer metering mechanism may also be used. | Plate type type mechanism, but the dimensions do not conform to the requirements given in the IS 6813:2000 | Does not conform |
| Cl 8.9 | TRANSMISSION SYSTEM | | |
| a) | Transmission system of seed cum fertilizer drill shall be sprocket and chain, or gear type. | Chain & sprocket type | Conforms |
| b) | Provisions for tightening of belt and adjustment of chain shall be provided. | Provided | Conforms |
| c) | Suitable clutches may be provided to stop the movement of metering mechanisms when the wheels are turned in reverse direction. | Not provided | Does not conform |
| d) | The transmission system shall be provided with guard for safety. | Provided | Conforms |
| Cl 9 | PERFORMANCE, REQUIREMENTS | | |
| Cl 9.1 | The variation in dropping of seed and fertilizer among different furrow openers shall be not more than 7% and 12.5% respectively from the average quantity obtained. | The variation in dropping of seed and fertilizer among different furrow openers was observed as under: **Wheat:** -64.3 to 93.4 % **Fertilizer:** -89.3 to 132.7 | Does not conform |
| Cl 9.2 | The variation in quantity dropped per hectare and quantity specified to be dropped at a particular setting shall not be more than 7 and 2.2 percent for seed and fertilizer respectively | The variation in quantity dropped per hectare and quantity 125 kg/ha to be dropped was observed as -59.77 to 6.05 and -66.56 to 18.35 % for seed & fertilizer respectively. | |
| Cl.9.3 | The seed and fertilizer rate shall be easily adjustable up to 125 kg and 1000 kg per ha respectively. | Seed rate adjustable upto 263.17 at 3.0 kmph speed. Fertilizer rate adjustable upto 1141.08 at 3.0 kmph speed. | Does not conform in toto |
| Cl.9.4 | The percentage of visible damage to seed in drill shall not exceed 0.5 percent. | The percentage of visible damage under: **Wheat:** 0.0 to 1.5% | Does not conform |
| Cl.9.5 | 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 of seed are as under: **Wheat:** -1407.7 to 57.0% | Does not conform |
| Cl.9.6 | The variation in quantity of seed dropping due to change in speed shall not exceed 15 percent of the quantity dropped under the specified speed. | Variation in dropping seed due to change in speed is as under: **Wheat:** -78.7 to 85.9% | Does not conform |
| Cl.9.8 | The drill shall be able to sow seed up to 100 mm. | Satisfactory | Conforms |
| Cl.9.10 | The wheel slip at specified speed shall not exceed by 15 percent. | The max wheel slip was observed as 1.49 to 3.25% | Conforms |
| Cl.9.11 | The drill shall be able to sow wheat and one or more of the following seeds: Barley, Paddy, Millet, Pea, Bengal gram, Soya bean and Pigeon pea. | Drill is tested to sow wheat seed and granular SSP fertilizer only. | Does not conform in toto |
| Cl 10 | **OTHER REQUIREMENTS** | | |
| Cl 10.1 | Tractor operated drill shall have 5 to 15 furrow openers. | Eleven numbers of furrow openers are provided. | Conforms |
| Cl 10.2 | The row spacing shall be adjustable, ranging from 150 to 225 mm, preferably in steps of 25 mm. | Adjustable from 150 to 225 mm. | Conforms |
| Cl 10.3 | When the furrow openers are lowered to plane surface, the opener shall not deviate by more than 5 mm from the line of alignment vertically and horizontally. | Vertical deviations were not noticed, but max horizontal deviation was observed as 3.1 to 3.3 mm from the line of alignment. | Conforms |
| Cl. 10.4 | The weight of tractor – mounted drill including the weight of seed filled at rated capacity of box shall not exceed 300 N/kW drawbar power of the tractor recommended for drill. | NR |
11. COMMENTS & RECOMMENDATIONS

11.1 The three point linkage system of the seed cum fertilizer drill does not conform to IS:4468 (Part 1):1997. This should be looked into.

11.2 The seed and fertilizer box should be provided with self-locking mechanism on being opened.

11.3 The lid for hopper was not provided. It MUST be provided.

11.4 Accessories like covering device, row marker, press wheel and area recorder may also be provided.

11.5 The chemical composition of inverted T shoe type furrow opener does not meet, in full, the requirement of IS: 6690-1981. This should be looked into for corrective action.

11.6 It is recommended that a permanent metallic calibration plate indicating the metering position and quantity of seed and fertilizer should be attached under the top cover of the seed box.

11.7 The recommended power of tractor is not specified, it MUST be specified.

11.8 The variation in dropping of seed among different furrow openers was observed to be too high and therefore needs to be looked into for improvement in design.

11.9 The variation in dropping due to box filling at 3/4th, 1/2nd and 1/4th of rated capacity and mechanical damage of seed were excessive and calls for improvement in the design.

11.10 The percentage of visible damage to seed drill is too high, hence its MUST be looked into for improvement in design.

11.11 Variation in the quantity of seed dropping due to change in the speed was excessive and this MUST be looked into for improvement in the design.

11.12 The labeling plate is not provided on the drill. It is therefore recommended that, a labeling plate with following information may be provided on the machine

I. Name of manufacturer and trade mark, if any
II. Make
III. Model
IV. Year of manufacturer
V. Serial No.
VI. Recommended power source, (kW)
VII. Seed to be sown

11.13 The Model of machine specified on application and model of machine provided on labeling plate on machine is different, It MUST be looked into for corrective action.

11.13 Technical Literature
No technical literature was provided for reference during the testing, therefore, it is recommended to provide operator’s manual, service manual and Parts catalogue. And operator’s manual should be brought out as per IS: 8132-1999.

TESTING AUTHORITY

R. K. NEMA
SENIOR AGRICULTURAL ENGINEER

P. K. PANDEY
DIRECTOR

12. APPLICANT’S COMMENTS

<table>
<thead>
<tr>
<th>Para No</th>
<th>Our reference</th>
<th>Applicant’s comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>11.1</td>
<td>Dimensions of three point linkage: We shall take appropriate action to improve the same.</td>
</tr>
<tr>
<td>12.2</td>
<td>11.2</td>
<td>Self locking: We shall take appropriate action to improve the same.</td>
</tr>
<tr>
<td>12.3</td>
<td>11.3</td>
<td>Lid on hopper: We shall take appropriate action.</td>
</tr>
<tr>
<td>12.4</td>
<td>11.5</td>
<td>Chemical composition: We ensure to comply the requirement of blade.</td>
</tr>
<tr>
<td>12.5</td>
<td>11.8</td>
<td>Seed variation: We shall take appropriate action to improve the same.</td>
</tr>
<tr>
<td>12.6</td>
<td>11.9</td>
<td>Damage: We shall take appropriate action to improve the same.</td>
</tr>
</tbody>
</table>