WHEAT STRAW REAPER
'TOOFAN'

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & COOPERATION)

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8. LABORATORY TESTS:

A. Hardness of knife blades (HRC)
   - As per IS: 6025-1999
   - As observed
   - Remarks
   - Hardened Zone: 48 to 58
   - Remainder Zone: 20 to 35

   a. Hardened Zone: 56
   - Conforms

   b. Remainder Zone: 16
   - Does not conform

B. Hardness of chaffer drum blade (HRC)
   - As per IS: 6025-1999
   - As observed
   - Remarks
   - Hardened Zone: 48 to 58
   - Remainder Zone: 20 to 35

   - Hardened Zone: 49
   - Conforms

   - Remainder Zone: 17
   - Does not conform

C. Chemical composition of Knife blades
   - As observed
   - As per IS: 6025-1999
   - Remarks
   - Carbon %: 0.81
   - Manganese %: 0.70

   - Carbon %: 0.70 to 0.95
   - Manganese %: 0.30 to 0.50

   - Conforms
   - Does not conform

D. Chemical composition of chaffer Drum blades
   - As observed
   - As per IS: 6025-1999
   - Remarks
   - Carbon %: 0.82
   - Manganese %: 0.67

   - Carbon %: 0.70 to 0.95
   - Manganese %: 0.30 to 0.50

   - Conforms
   - Does not conform

9. FIELD TEST

The straw reaper fitted with Sonalika International 750 II (DI) tractor at engine throttle setting corresponding to 1700 rpm was tested in the field for 51.6 hours for reaping of left over straw stubbles after harvesting by grain combine harvester. The tractor front was fitted with a wire mesh box type structure to prevent dust deposition on radiator. During tests field performance of straw reaper was assessed with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The crop parameters, atmospheric conditions and performance parameters as observed during field tests are also given in Annexure-II. The detail of the tractor used for field operation are given in Annexure-I
9.1 Rate of work and fuel consumption

The "split straw percentage" is defined as the percentage of straw split to the total weight of straw sample collected after passing through the machine. The quantity of straw collected is expressed in terms of straw recovery percentage which is defined as the percentage of difference of straw weight before and after machine operation to the initial weight of straw in the randomly selected sample area of test field.

During straw field tests, output of the machine varied from 0.400 to 0.474 ha/h. The forward speed varied from 2.46 to 3.02 kmph in L-1 gear. Fuel consumption varied from 5.02 to 6.51 l/h.

The results of field performance tests are summarized in Table-1 and detail is given in Annexure-II.

<table>
<thead>
<tr>
<th>Crop variety</th>
<th>Forward speed (kmph)</th>
<th>Rate of work (ha/h)</th>
<th>Rate of work (h/ha)</th>
<th>Fuel consumption (l/h)</th>
<th>Fuel consumption (l/ha)</th>
<th>Av. Length of straw (mm)</th>
<th>Straw split (%)</th>
<th>Straw recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBW-343</td>
<td>2.47 to 2.97</td>
<td>0.406 to 0.474</td>
<td>2.19 to 2.61</td>
<td>5.89 to 6.20</td>
<td>13.0 to 14.87</td>
<td>12.64 to 16.0</td>
<td>97.4 to 98.0</td>
<td>74.4 to 75.2</td>
</tr>
<tr>
<td>WH-711</td>
<td>2.92 to 3.02</td>
<td>0.412 to 0.452</td>
<td>2.22 to 2.43</td>
<td>5.99 to 6.51</td>
<td>13.8 to 14.55</td>
<td>14.40 to 15.6</td>
<td>97.4 to 98.7</td>
<td>76.8 to 79.3</td>
</tr>
<tr>
<td>Jai</td>
<td>2.46 to 2.51</td>
<td>0.400 to 0.423</td>
<td>2.36 to 2.50</td>
<td>5.02 to 5.46</td>
<td>12.0 to 13.56</td>
<td>11.88 to 18.5</td>
<td>96.7 to 98.0</td>
<td>71.8 to 81.3</td>
</tr>
</tbody>
</table>

9.3 Quality of work:

9.3.1 Wheat straw harvesting:

During the field test straw split & straw recovery ranged from 96.7 to 98.7% and 71.8 to 81.3% respectively.

The length of straw in wheat varied from 12.0 to 18.5 mm. The straw recovery mainly depends upon the height of left over straw stubbles in the field harvested by the combine harvester. The length and splitting of straw so formed is considered to be satisfactory as animal feed.

10 EASE OF HANDLING DURING OPERATION.

No specific problem was observed in handling during operation of straw reaper.

11 LABOUR REQUIREMENTS.

Prior to each test, one man hour was required for daily maintenance of tractor and straw reaper for operation. Otherwise one skilled operator is needed to operate tractor with straw reaper. Additional man hours are required for handling and transportation of straw.
13  SOUNDNESS OF CONSTRUCTION

No breakdown was observed during 50.5 hrs. of field tests.

14  SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS:

14.1. Rate of work and fuel consumption:

On the basis of field tests, output of the machine varied from 0.400 to 0.474 ha/h. The forward speed of tractor Sonalika International-750 III (DI) varied from 2.46 to 3.02 kmph in L-1 gear. Fuel consumption of tractor varied from 5.02 to 6.51 l/h (11.88 to 14.87 l/ha).

14.1.2 Quality of work:

Quality of straw is expressed in terms of split straw percentage and length of straw. The split straw was observed as 96.7 to 98.7 %. The average length of straw observed from 12.0 to 18.5 mm. The straw recovery was from 71.8 to 81.3 %.

14.3  COMMENTS AND RECOMMENDATIONS:

1. Quality of wheat straw was observed to be satisfactory as animal feed.

2. It is recommended to incorporate the guards/covers on belt pulley drive system.

3. The Straw split percentage was observed from 96.7 to 98.7. This is considered to be normal.

4. Hardness of knife blade and chaffer drum blade in its reminder zone does not conform to relevant Indian Standard (IS: 6025-1999). This should be incorporated at regular production level.

5. The chemical composition of manganese in knife & chaffer drum blade of components do not comply with the limits specified in IS: 6025-1999.

6. The safety device & guards should be provided on the propeller shaft.

7. An identification plate should be provided on each unit at regular production level.