STRAW REAPER COMBINE
“AS-667”

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

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B. Chemical analysis of primary elements

Table-4: Chemical analysis of critical components

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Component</th>
<th>Primary element</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Carbon</td>
</tr>
<tr>
<td>1</td>
<td>Knife blade</td>
<td>0.80</td>
</tr>
<tr>
<td>2</td>
<td>Knife guard</td>
<td>0.38</td>
</tr>
<tr>
<td>3</td>
<td>Cylinder blade</td>
<td>0.79</td>
</tr>
<tr>
<td>4</td>
<td>Concave blade</td>
<td>0.37</td>
</tr>
</tbody>
</table>

8. FIELD TEST

The straw reaper fitted with Farmtrac-60 tractor at engine throttle setting corresponding to 1600 rpm was tested in the field for 35.0 hours for reaping of left over straw & stubbles after harvesting by grain combine harvester. 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 given in Annexure-II & III and summarized in Table-5 & 6. The detail of the tractor used for field operation are given in Annexure-I.

Table-5: Summary of field and crop conditions

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameters</th>
<th>Range of parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plant population, No./m²</td>
<td>315 to 382</td>
</tr>
<tr>
<td>2</td>
<td>Available straw, kg/m²</td>
<td>0.389 to 0.778</td>
</tr>
<tr>
<td>3</td>
<td>Moisture content of straw, %</td>
<td>N.R.</td>
</tr>
<tr>
<td>4</td>
<td>Percentage of loose straw per square meter, %</td>
<td>51 to 77</td>
</tr>
<tr>
<td>5</td>
<td>Height of stubbles before harvesting, mm</td>
<td>307 to 350</td>
</tr>
<tr>
<td>6</td>
<td>Height of stubbles after harvesting, mm</td>
<td>73 to 118</td>
</tr>
<tr>
<td>7</td>
<td>Straw mass density recovered manually at 8% moisture and at a height of 35 mm</td>
<td>N.R.</td>
</tr>
</tbody>
</table>

Table-6: Summary of field performance test

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Observations</th>
<th>Range of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed of operation, kmph</td>
<td>2.17 to 2.64</td>
</tr>
<tr>
<td>2</td>
<td>Width of cut, m</td>
<td>1.92 to 2.02</td>
</tr>
<tr>
<td>3</td>
<td>Overlap percent</td>
<td>2.9 to 7.7</td>
</tr>
<tr>
<td>4</td>
<td>Rate of work, ha/h</td>
<td>0.312 to 0.758</td>
</tr>
<tr>
<td>5</td>
<td>Fuel consumption</td>
<td>3.911 to 4.955 l/h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.413 to 15.881 l/ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.398 to 4.130 l/tonne</td>
</tr>
</tbody>
</table>
6. Power consumption, kW
   | 11.13 to 24.39
7. Average length of straw, mm
   | 31 to 41
8. Straw split percent
   | 91 to 96
9. Straw recovery percent
   | 80.8 to 94.8
10. Grain recovery percent
    | 28.3 to 67.1
11. Awn recovery, %
    | 4-9

8.1 Quality of work:
It refers to average length of straw, split straw & straw recovery percentage, dust and awn percentage in wheat straw produced by straw combine. Average length of straw ranged from 32 to 41mm. Straw split percentage ranged from 91 to 96% and dust and own percentage in straw ranged from 4 to 9 percent. Recovery of grain from the left over wheat straw in field by straw reaper combine ranged from 28.3 to 67.1 %.

8.2 Rate of work:
Rate of work of straw reaper combine consists of two main points: (a) Area covered per unit, time and (b) straw recovery. Area covered ranged from 0.312 to 0.758 ha/h. Straw recovery ranged from 80.8 to 94.8 percent. Overlap percentage ranged from 2.9 to 7.7%. Fuel consumption of tractor to operate the straw reaper combine combination (reaper and tractor trolley) ranged from 1.398 to 4.130 l/tonne. Power required to operate straw reaper combine is 11.13 to 24.39 kW.

9. EASE OF HANDLING DURING OPERATION.
No specific problem was observed in handling during operation of straw reaper combine.

10. LABOUR REQUIREMENTS.
Prior to each test, two 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 labour are required for handling and transportation of straw.

11. WEAR OF CRITICAL COMPONENTS
The wear of serrated blades of cutter bar, chaffer cylinder and concave was measured after completion of 35 hours of wheat straw harvesting. Percentage wear on mass & dimensional basis were computed and the results are given below in Table- 7& 8:-
12 DEFECTS, ADJUSTMENTS, BREAK DOWNS AND REPAIRS.
No breakdown was observed during 35.0 hrs. of field operation under test.

13 COMMENTS AND RECOMMENDATIONS:
1. Quality of wheat straw was observed to be satisfactory and is considered to be suitable as animal feed.
2. Rate of work varied from 0.312 to 0.758 ha/h and fuel consumption from 3.911 to 4.955 l/h.
3. Power consumption was observed as 24.39 kw at maximum load. The tractor used was of 33.3 kw p.t.o. power hence 73.3% power of tractor was utilized.
4. Average length of straw varied from 32 to 41 mm and straw split from 91 to 95%.
5. Straw and grain recovery ranged from 80.8 to 94.8% & 28.3 to 67.17% respectively.
6. No arrangement is provided for the adjustment of belt. Idler pulleys to adjust belt should be provided.
7. Safety guards should be provided on the pulleys for safety point of view.

14. LITERATURE
No literature in any form was provided with machine. It is recommended that operator cum service manual, having Spare part catalogue etc. should be brought out as per IS: 8132-1983 for guidance of users & service personnel.

TESTING AUTHORITY

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ASSISTANT ENGINEER (W/S)

(P. K. CHOPRA)
SENIOR AGRICULTURAL ENGINEER

(A. N. MESHRAM)
DIRECTOR

APPLICANT'S COMMENT
No comment received.