1. INTRODUCTION

Cotton is the livelihood for an estimated 60 million Indians including 6 million farmers, mostly small and marginal. Cotton is a very important commodity in Indian Agriculture. India hosts 1/3rd of the global acreage of cotton but accounts for less than 1/5th of the global production. In 2010-11, India was the world’s second largest cotton producer, consumer and exporters (FAOSTAT). Recent technological advances and trade liberalization has made India a major player in international cotton markets.

Though India is the second most important producers of cotton in the world, the productivity in cotton production is very low compared to that of the world’s average. Various reasons have been attributed to the existence of lower than world average, yield in India like the inadequate inputs, lack of awareness about modern cultivation practices among Indian farmers, lack of irrigation facilities, untimely operations on field, inefficient crop production technologies and too much dependency on labor to cultivate cotton (Majumdar, 2012). In many parts of India, the farmers still use human labor for many operations like planting, weeding and picking and use inefficient farm implements / machinery for those operations. The adoption of machinery in farm operations is lagging because of various factors like unavailability of credit to purchase expensive machinery, small size holdings of farmers and lack of technical knowledge and skills to operate complex farm machinery.

Cotton crop demands intensive labour right from sowing till harvest of crop. All the tasks performed manually require lots of time, energy and involve drudgery and subsequently leading to several health hazards. Besides this, non-availability of manpower during peak crop season is a growing problem and the load of all these drudgery prone cropping operations is ultimately shifted on the shoulders of women farmers because the mechanization has been considered as the domain of men only.

The study was undertaken with the following objectives:

- To assess the drudgery in sowing, weeding and harvesting of cotton crop.
- To explore the health hazards during sowing, weeding and harvesting of cotton crop.

2. METHODOLOGY
The study was conducted in Sakrawas village of Relmagra Panchayat Samiti in Rajsamand district of Rajasthan. The sample consisted of 30 women farmers engaged exclusively in cotton cultivation from last 10 years. The samples were purposively drawn and an interview schedule was used for collecting the information from individual women farmer. Drudgery experienced by women farmers was assessed on a 5 point continuum scale, on six parameters which gave a total score of drudgery out of maximum score of 30.

The six parameters on which drudgery scores were calculated were, Rating on work demand, Rating on feeling of exhaustion, Rating on posture assumed in work, Perception on manual loads operatives, Rating on difficulty perception and Rating on work load perception.

3. RESULTS AND DISCUSSION

The women farmers selected for the study belonged to farming community. They were all married and were below the age range of 25-45 years. It was elicited that sowing, weeding and harvesting of cotton were women dominated activities in cotton cultivation. Cotton sowing is very tedious and requires constant bending of nearly 32 times a minute. It was revealed that the highest score out of 5 was calculated for rating on work demand i.e. it was ‘very demanding’, followed by feeling of exhaustion which ranged between ‘very exhausted and exhausted’ with a score of 4.40/5. The overall drudgery score for sowing was 24.84/30. This shows the overall hardship faced by the respondents was very high.

The drudgery/hardship faced by women do not end after sowing, weeding again was very tiring and time consuming activity for the women farmers. They spent nearly 25-30 days in weeding at different intervals. The drudgery in weeding was rated ‘very high’ on work demand and feeling of exhaustion, followed by manual loads operative, difficulty perception, work load perception and posture assumed respectively. The overall drudgery score was 25.80/30.

Similarly, the overall drudgery of cotton harvesting which was again a women dominated activity was very high (27.83/30). This was due to high work demand (4.80), feeling of exhaustion (4.80), posture assumed (4.50), manual load (4.33), difficulty perception (4.77) and work load perception (4.63). Thus, it was concluded that sowing, weeding and harvesting in cotton cultivation were drudgery prone activities. The most drudgery prone amongst the three was harvesting. Such a high drudgery score calls for technological interventions to reduce the overall drudgery in cotton cultivation.

Cumulative drudgery scores for all the above activities are presented in table -1. The most drudgery prone activity was harvesting followed by weeding and then sowing. The highest scores were calculated for rating on work demand followed by feeling of exhaustion (Fig1).
Table-1. Cumulative Drudgery scores experienced by women farmers in different activities of cotton cultivation.

<table>
<thead>
<tr>
<th>Activities in Cotton cultivation</th>
<th>Rating on work demand (A)</th>
<th>Rating on feeling of exhaustion (B)</th>
<th>Rating on posture assumed in work (C)</th>
<th>Perception on manual loads operatives (D)</th>
<th>Rating on difficulty perception (E)</th>
<th>Rating on work load perception (F)</th>
<th>Total Drudgery Score (Max Score 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sowing</td>
<td>4.63</td>
<td>4.40</td>
<td>3.83</td>
<td>4.07</td>
<td>4.20</td>
<td>3.73</td>
<td>24.87</td>
</tr>
<tr>
<td>Weeding</td>
<td>4.63</td>
<td>4.53</td>
<td>3.83</td>
<td>4.07</td>
<td>4.63</td>
<td>4.10</td>
<td>25.80</td>
</tr>
<tr>
<td>Harvesting</td>
<td>4.80</td>
<td>4.80</td>
<td>4.50</td>
<td>4.33</td>
<td>4.77</td>
<td>4.63</td>
<td>27.83</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14.06</strong></td>
<td><strong>13.73</strong></td>
<td><strong>12.16</strong></td>
<td><strong>12.47</strong></td>
<td><strong>13.60</strong></td>
<td><strong>12.46</strong></td>
<td><strong>78.50</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4.68</strong></td>
<td><strong>4.57</strong></td>
<td><strong>4.05</strong></td>
<td><strong>4.15</strong></td>
<td><strong>4.53</strong></td>
<td><strong>4.15</strong></td>
<td><strong>26.16</strong></td>
</tr>
</tbody>
</table>

Fig: 1. Cumulative Drudgery scores experienced by women farmers on different parameters of drudgery in cotton cultivation.
As is evident from the Fig 1, all the parameters for cotton cultivation were perceived as ‘high’ by the women and overall drudgery score for cotton cultivation was also alarming as it was very high that is, 26.16/30.

The health hazards experienced by women farmers during sowing, weeding and harvesting of cotton crop were also explored. In sowing activity pain in shoulders, hands, palm and feet was reported by 57% and headache by 30% of the respondents. In weeding, injury in feet was reported by 87% and pain in shoulder by 73%. While in harvesting of cotton, 80% of the respondents reported wounds and cuts in hands. Thus, feedback from women clearly depicted that cotton cultivation involves many health hazards (Fig 2).

**Fig 2. Health hazards experienced by women farmer in different activities of cotton cultivation (%).**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Pain in shoulder, hand, palm, feet</th>
<th>Breaking of nails</th>
<th>Itching and burning of palm</th>
<th>Wound and cuts in hands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sowing</td>
<td>43</td>
<td>23</td>
<td>27</td>
<td>60</td>
</tr>
<tr>
<td>Weeding</td>
<td>73</td>
<td>47</td>
<td>23</td>
<td>87</td>
</tr>
<tr>
<td>Picking</td>
<td>57</td>
<td>60</td>
<td>43</td>
<td>27</td>
</tr>
</tbody>
</table>

**CONCLUSION**

Current farming practices used by women farmers have considerable degree of ergonomic and health impact on the body of the worker. Cotton cultivation is very arduous and drudgery prone as various activities involved are still performed in age old methods, resulting in various occupational health hazards. There is a need to bring in technological intervention by promoting mechanization of various activities involved especially those predominantly performed by women. The educational programs to increase the awareness of women farmers on usage of simple agricultural tools & technologies would also help the women farmers...
to better understand safe practices in farming such as use of correct postures, safe storage and handling, pesticide and chemicals to be used in farming etc.

Further, use of simple agricultural tools would enable women farmers to increase their agricultural productivity and efficiency thereby increasing household level income to support women farmers to have better access to health and education.

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