Plants have been an integral part of human civilization. Many wild plants still supply food to large section of society. There are about 3000 edible plant species known to man, with merely 30 crops contributing to more than 90% of the world’s calorie intake. In India there are about 1532 wild edible plant species. Tribal people have been identified as a group of people who have deep knowledge concerning the use of wild plants as food resources. Tribals constitute an important part of the population of India, representing about 8% of the total population; it is about 12.56% of the total population of Rajasthan, where current study was conducted.

STUDY AREA
Rajasthan is the largest state of India, located in the northwestern part of country. Geographically it lies between 23°30’ to 30°12’ longitude and 69°30’ and 78°17’ latitude. (Fig 1).

The state has been homeland of many tribal communities. Major primitive tribes are Bhil, Bhil-Mena, Damor, Dhanaka, garasia, Kathodia, Koli, Sahariya. Besides these there are some nomadic, semi nomadic tribes and denotified communities also. From population point of view, Meena, Bhil, Damor, garasia and Sahariya are significant.

Wild edible plants are being used by these tribal people particularly during scarcity and in dry months. During normal times also they provide article of diet to the tribal population.

Therefore, agriculture is not the main economic feature of the population, and so could not completely satisfy the food demand of the population.

The current study helps to understand the importance of these edible plants at commercial scale, thus helping out government policies to improve food security of the state, through proper developmental planning. The present study information coupled with further scientific investigation could help in extensive cultivation of these wild edible plants which could act as source of income to the tribal group and provide employment to them, thus improving their economy.
MATERIALS AND METHODS
Several field trips were undertaken in different tribal regions of the study area during the year 2009-2011, to collect information on wild edible plant parts. The collected herbal plants were identified up to genus level from flora of Shetty and Singh (1993). Persons possessing the information about the wild edible plants, villagers and family headman, elders, users, and collectors from the villages were consulted and interviewed to gather the information. The data were collected by discussions, observations and cross checking at different places among various tribes and rural people.

OBSERVATIONS
The ethno-botanical information about wild food plants are given by mentioning their botanical name, family, plant part used, food type and habit of the plant species (Table 1).

RESULTS AND DISCUSSION
The present survey documented 46 plant species, belonging to 30 families, which are used as edible plants. Moraceae and Poaceae recorded highest number of species (4 Species). Among the total plant species trees are highest in number (18) followed by herbs (11), shrubs (10), grasses (4) and climbers (3). Out of the total wild plants, 27 species are used as fruits, followed by seeds (10), tubers (8), Leaves (8) and flowers (4).

The traditional communities use these wild edible plants as important diet source as these edible plant parts have high nutritive value. Nutritional aspect of important plant species was also checked (Table 2).

PLANTS WITH EDIBLE FRUITS: The survey has shown that most of the fruits are eaten in raw form, like Aegle marmelos, Annona squamosa, Citrullus lanatus, Mangifera indica, Prosopis cineraria, Prosopis chilensis, Salvadora persica. It was reported that fruits of plants like Bombax ceiba, Capparis deciduas, Momordica dioica, Nelumbo nucifera are cooked and consumed as vegetable.

Annona squamosa, Emblica officinalis, Mangifera indica are species whose fruits are used for preparing jams or pickles. Species like Ficus carica and Ziziphus nummularia act as dry fruits. Pulp of fruits of Annona squamosa, Cassia fistula, Citrullus lanatus, Mangifera indica, are used for preparation of squashes.

PLANTS WITH EDIBLE SEEDS: Since the study area faces harsh climatic conditions, seeds of wild plants like Nelumbo nucifera, Trapa natans are eaten in times of scarcity in raw form.

Seeds of Cenchrus biflorus are eaten mixed with Bajra for bread making and are also eaten raw. Seeds of Citrullus lanatus are used in many forms, when seeds flour are mixed with bajra flour, they are used to make cakes, when roasted and grounded, they are used as flavouring agent in sauces and soups. Seeds of Citrullus colocynthis are washed with salt water and grind to make chapattis, very frequently used during famine. Seeds of Dactylocetenuim aegypticum are eaten cooked into a thick porridge or the husked seeds are boiled in water to a thick mush. Seeds of Echinocloa colorum are boiled in water and used as a substitute for rice. When plant starts drying, branches are threshed and seeds pounded for flour for making bread. Seeds of Lasius hirsutus when mixed with bajra act as cereal food. Seeds of Tamarindus indica have many uses, when dried and grounded to powder; it is used in chapattis, while it is also eaten raw. Seeds of Trapa natans are eaten as raw, cooked and roasted food while in times of scarcity dried seeds act as substitute for cereal flour.

PLANTS WITH EDIBLE UNDERGROUND PARTS-ROOTS,RHIZOMES,TUBERS: At least 9 wild plant species from the study area are known of which roots, tubers, and rhizomes are eaten in almost all regions of the study area. The underground part is either eaten raw as in the case of Pueraria tuberosa or cooked after repeated washing to get rid of bitterness and pungency (Asparagus racemosus, Dioscorea bulbifera, Trapa natans, Urginea indica). Dried rhizome of Nelumbo nucifera is added to curries, chips and pickles to add flavor, while tuber of Colocasia esculenta is used in preparation of Soups, Gravies, Pan cakes, Bread making, Biscuits, Puddings etc.

PLANTS WITH EDIBLE LEAVES: Survey has shown that most of the tribes use leafy part of wild plants as vegetables, these include leaves of Abrus precatorius, Achyranthes aspera, Amananthus viridis, Boerhavia diffusa, Cassia auriculata which are cooked as vegetables.

PLANTS WITH EDIBLE FLOWER: Flowers of plants like Bombax ceiba, Cassia auriculata, Cassia fistula and Nelumbo nucifera are cooked and eaten as vegetable.
<table>
<thead>
<tr>
<th>S No</th>
<th>Botanical Name</th>
<th>Family</th>
<th>Plant part used</th>
<th>Food type</th>
<th>Habit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>EDIBLE FRUITS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Aegle marmelos</td>
<td>Rutaceae</td>
<td>Fruit pulp</td>
<td>Edible</td>
<td>Tree</td>
</tr>
<tr>
<td>2</td>
<td>Annona squamosa</td>
<td>Annonaceae</td>
<td>Ripe fruit/pulp</td>
<td>jams/Squash</td>
<td>Shrub</td>
</tr>
<tr>
<td>3</td>
<td>Azadirachta indica</td>
<td>Meliaceae</td>
<td>Ripe fruits</td>
<td>Edible</td>
<td>Tree</td>
</tr>
<tr>
<td>4</td>
<td>Bombax ceiba</td>
<td>Bombacaceae</td>
<td>Fruit</td>
<td>vegetable</td>
<td>Tree</td>
</tr>
<tr>
<td>5</td>
<td>Capparis decidua</td>
<td>Capparaceae</td>
<td>Ripe &amp; Unripe fruit</td>
<td>Edible/Pickle</td>
<td>Shrub</td>
</tr>
<tr>
<td>6</td>
<td>Capparis sepiaria</td>
<td>Capparaceae</td>
<td>ripe fruit</td>
<td>Edible</td>
<td>Shrub</td>
</tr>
<tr>
<td>7</td>
<td>Cassia fistula</td>
<td>Caesalpiniaceae</td>
<td>Ripe fruit pulp</td>
<td>Squash</td>
<td>Tree</td>
</tr>
<tr>
<td>8</td>
<td>Citrullus lanatus</td>
<td>Cucurbitaceae</td>
<td>Fruit/pulp</td>
<td>Edible/pickle</td>
<td>Herb</td>
</tr>
<tr>
<td>9</td>
<td>Diospyros melanoxylon</td>
<td>Ebenaceae</td>
<td>Ripe fruit</td>
<td>Edible</td>
<td>Tree</td>
</tr>
<tr>
<td>10</td>
<td>Emblica officinalis</td>
<td>Euphorbiaceae</td>
<td>Fruit</td>
<td>Pickle</td>
<td>Tree</td>
</tr>
<tr>
<td>11</td>
<td>Ficus benghalensis</td>
<td>Moraceae</td>
<td>Unripe fruit</td>
<td>Edible</td>
<td>Tree</td>
</tr>
<tr>
<td>12</td>
<td>Ficus carica</td>
<td>Moraceae</td>
<td>Fruit</td>
<td>Dry fruit/Preserves</td>
<td>Tree</td>
</tr>
<tr>
<td>13</td>
<td>Ficus religiosa</td>
<td>Moraceae</td>
<td>ripe fruit</td>
<td>Scarcity food</td>
<td>Tree</td>
</tr>
<tr>
<td>14</td>
<td>Grewia tenax</td>
<td>Tiliaceae</td>
<td>Unripe fruit</td>
<td>Edible</td>
<td>Shrub</td>
</tr>
<tr>
<td>15</td>
<td>Holoptelea integrifolia</td>
<td>Ulmaceae</td>
<td>Fruit</td>
<td>Edible</td>
<td>tree</td>
</tr>
<tr>
<td>16</td>
<td>Mangifera indica</td>
<td>Anacardiaceae</td>
<td>Fruit</td>
<td>Squash, Jam, Beverages</td>
<td>Tree</td>
</tr>
<tr>
<td>17</td>
<td>Momordica dioica</td>
<td>Cucurbitaceae</td>
<td>Unripe fruit</td>
<td>Vegetable</td>
<td>Climber</td>
</tr>
<tr>
<td>18</td>
<td>Morus alba</td>
<td>Moraceae</td>
<td>Fruits</td>
<td>Edible/Squash</td>
<td>Tree</td>
</tr>
<tr>
<td>19</td>
<td>Nelumbo nucifera</td>
<td>Nymphaeaceae</td>
<td>Fruits</td>
<td>Roasted food</td>
<td>Aquatic herb</td>
</tr>
<tr>
<td>20</td>
<td>Phoenix sylvestris</td>
<td>Areceaceae</td>
<td>Ripe fruits</td>
<td>Jam/juice</td>
<td>Tree</td>
</tr>
<tr>
<td>21</td>
<td>Prosopis cineraria</td>
<td>Mimosaceae</td>
<td>Fruits</td>
<td>dryfood/boiled food</td>
<td>Tree</td>
</tr>
<tr>
<td>22</td>
<td>Prosopis chilensis</td>
<td>Mimosaceae</td>
<td>Fruits</td>
<td>Edible/cakes</td>
<td>Tree</td>
</tr>
<tr>
<td>23</td>
<td>Salvadorae persica</td>
<td>Salvadoreaceae</td>
<td>Ripe fruits</td>
<td>Edible/fermented</td>
<td>Tree</td>
</tr>
<tr>
<td>24</td>
<td>Solanum nigrum</td>
<td>Solanaceae</td>
<td>Ripe fruit</td>
<td>Edible/Jam</td>
<td>Herb</td>
</tr>
<tr>
<td>25</td>
<td>Sterculia urens</td>
<td>Sterculiaceae</td>
<td>Fruit</td>
<td>Vegetable</td>
<td>Tree</td>
</tr>
<tr>
<td>26</td>
<td>Tamarindus indica</td>
<td>Caesalpiniaceae</td>
<td>Fruit pulp</td>
<td>Flavouring agent</td>
<td>Tree</td>
</tr>
<tr>
<td>27</td>
<td>Ziziphus nummularia</td>
<td>Rhamnaceae</td>
<td>Fruit</td>
<td>Edible/dry fruit</td>
<td>Shrub</td>
</tr>
<tr>
<td></td>
<td><strong>EDIBLE SEEDS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Chenchus biflorous</td>
<td>Poaceae</td>
<td>Seeds</td>
<td>Eaten cooked &amp; raw</td>
<td>Grass</td>
</tr>
<tr>
<td>29</td>
<td>Citrullus colocynthis</td>
<td>Cucurbitaceae</td>
<td>Seeds</td>
<td>Flour</td>
<td>Herb</td>
</tr>
<tr>
<td>30</td>
<td>Citrullus lanatus</td>
<td>Cucurbitaceae</td>
<td>Seeds</td>
<td>Flavouring agent</td>
<td>Herb</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refreshing drink</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Dactylocetenuim aegypticum</td>
<td>Poaceae</td>
<td>Seeds</td>
<td>Eaten cooked</td>
<td>Grass</td>
</tr>
<tr>
<td>32</td>
<td>Echinocolonum colonum</td>
<td>Poaceae</td>
<td>Seeds</td>
<td>Eaten cooked</td>
<td>Grass</td>
</tr>
<tr>
<td>33</td>
<td>Ephedra foliata</td>
<td>Gnetaceae</td>
<td>Seeds</td>
<td>Eaten cooked</td>
<td>Shrub</td>
</tr>
<tr>
<td>34</td>
<td>Laxius hirsutus</td>
<td>Poaceae</td>
<td>Seeds</td>
<td>Cereal food</td>
<td>Grass</td>
</tr>
<tr>
<td>35</td>
<td>Nelumbo nucifera</td>
<td>Nymphaeaceae</td>
<td>Seeds</td>
<td>Eaten Raw</td>
<td>Aquatic herb</td>
</tr>
<tr>
<td>36</td>
<td>Tamarindus indica</td>
<td>Caesalpiniaceae</td>
<td>Seeds</td>
<td>Eaten cooked</td>
<td>Tree</td>
</tr>
<tr>
<td>37</td>
<td>Trapa natans</td>
<td>Trapaceae</td>
<td>Seeds</td>
<td>Raw food, Cooked</td>
<td>Herb</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Roasted food</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>EDIBLE UNDEGROUND PARTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Asparagus racemosus</td>
<td>Liliaceae</td>
<td>Tuberous Roots</td>
<td>Edible</td>
<td>Shrub</td>
</tr>
<tr>
<td>39</td>
<td>Celoperia balboa</td>
<td>Asclepiadaceae</td>
<td>Tubber</td>
<td>Edible</td>
<td>Herb</td>
</tr>
<tr>
<td>40</td>
<td>Colocasia esculenta</td>
<td>Araceae</td>
<td>Tuber</td>
<td>Vegetable/Soups, Gravies, Pancakes</td>
<td>Herb</td>
</tr>
<tr>
<td>41</td>
<td>Dioscorea bulbifera</td>
<td>Dioscoreaceae</td>
<td>Bulb</td>
<td>Vegetable</td>
<td>Herb</td>
</tr>
<tr>
<td>42</td>
<td>Dioscorea hispida</td>
<td>Dioscoreaceae</td>
<td>tuber</td>
<td>Flour</td>
<td>Climber</td>
</tr>
</tbody>
</table>
43. *Nelumbo nucifera*
   - Family: Nymphaeaceae
   - Plant part: Dried Rhizome
   - Use: Added to curries, chips
   - Habitat: Aquatic herb

44. *Pueraria tuberosa*
   - Family: Fabaceae/Papilionaceae
   - Plant part: Bulb
   - Use: Edible
   - Habitat: Shrub

45. *Trapa natans*
   - Family: Trapaceae
   - Plant part: Rhizome
   - Use: Vegetable
   - Habitat: Shrub

**EDIBLE LEAVES**

46. *Abrus precatorius*
   - Family: Fabaceae
   - Plant part: leaves
   - Use: Vegetable
   - Habitat: Shrub

47. *Achyranthes aspera*
   - Family: Amaranthaceae
   - Plant part: Tender leaves
   - Use: Vegetable
   - Habitat: Herb

48. *Boerhavia diffusa*
   - Family: Nyctaginaceae
   - Plant part: Tender leaves
   - Use: Vegetable
   - Habitat: Herb

49. *Cassia auriculata*
   - Family: Caesalpiniaceae
   - Plant part: Leaves and pods
   - Use: Vegetable
   - Habitat: Shrub

50. *Cassia fistula*
   - Family: Caesalpiniaceae
   - Plant part: Leaves and pods
   - Use: Vegetable
   - Habitat: Tree

51. *Cayratia trifolia*
   - Family: Vitaceae
   - Plant part: Tender leaves
   - Use: Vegetable
   - Habitat: Climber

52. *Solanum nigrum*
   - Family: Solanaceae
   - Plant part: Leaves
   - Use: Vegetable
   - Habitat: Shrub

53. *Nelumbo nucifera*
   - Family: Nymphaeaceae
   - Plant part: Flower
   - Use: Vegetable
   - Habitat: Aquatic herb

**EDIBLE FLOWERS**

54. *Bombax ceiba*
   - Family: Bombaceae
   - Plant part: Flower bud and calyx
   - Use: Vegetable
   - Habitat: Tree

55. *Cassia auriculata*
   - Family: Caesalpiniaceae
   - Plant part: Flower
   - Use: Vegetable
   - Habitat: Shrub

56. *Cassia fistula*
   - Family: Caesalpiniaceae
   - Plant part: Flower
   - Use: Vegetable
   - Habitat: Tree

57. *Nelumbo nucifera*
   - Family: Nymphaeaceae
   - Plant part: Flower
   - Use: Vegetable
   - Habitat: Aquatic herb

**Table 2. Nutritive values of plant species**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Plant species</th>
<th>Plant part</th>
<th>Moisture (%)</th>
<th>Fibres (%)</th>
<th>Carbohydrate (%)</th>
<th>Protein (%)</th>
<th>Mineral matter (%)</th>
<th>Fats</th>
<th>Vitamin (U.I./mg)</th>
<th>Calcium (U.I./mg)</th>
<th>Magnesium (U.I./mg)</th>
<th>Phosphorous (U.I./mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Bombax ceiba</em></td>
<td>Root</td>
<td>7.50</td>
<td>11.95</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td><em>Citrullus lanatus</em></td>
<td>Fruit</td>
<td>95.80</td>
<td>0.20</td>
<td>3.30</td>
<td>0.20</td>
<td>0.02</td>
<td>0.10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td><em>Nelumbo nucifera</em></td>
<td>Rhizome</td>
<td>83.80</td>
<td>2.6</td>
<td>66.60</td>
<td>0.20</td>
<td>-</td>
<td>0.90</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td><em>Solanum nigrum</em></td>
<td>Leaf</td>
<td>82.10</td>
<td>8.90</td>
<td>18.20</td>
<td>2.10</td>
<td>0.11</td>
<td>2.40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td><em>Tamarindus indica</em></td>
<td>Leaf</td>
<td>20.90</td>
<td>3.80</td>
<td>5.80</td>
<td>2.00</td>
<td>0.10</td>
<td>0.24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Since the study area faces harsh climatic condition, few important wild plants are identified as 'Emergency Foods' used during famines and drought in case of scarcity of food. These are: Cenchrus biflorous, Prosopis cineraria, Capparis deciduas, Ziziphus nummulaia, Citrullus colocynthis, Citrullus lanatus, Salvadora persica. A total 8 species are identified which have multiple usages i.e. more than one plant part is edible. Flowers, fruits and leaves of species like Bombax ceiba, Cassia auriculata, Cassia fistula and Solanum nigrum are edible, while fruits & seeds of Citrullus lanatus and Tamarindus indica have edible use. Similarly, seeds and rhizome of Nelumbo nucifera and Trapa natans are useful.

We learned through the survey that since the major part of the study area is a desert, agriculture could not satisfy the food demand of the tribal people, therefore, local people still depend on plant resources for their food supply and because of overexploitation few natural wild plants are facing the threat of extinction. Three species have been categorized into Red Data List. Among these, Salvadora persica has identified as endangered species, while Citrullus colocynthis and Ephedra foliate are vulnerable species. The lack of effort to sustain resources may result in their depletion from natural habitats.

CONCLUSION

The present study help to prepare a list of important edible wild plants which make remarkable contribution to the food security of the tribal people in many parts of the state. The current study could be helpful in many aspects. In order to satisfy the food demand of ever increasing population of our country, there is need to document the nutritional value of such wild plants, so that they can provide a nutritionally balanced food to the traditional communities. Further, the study suggest that local knowledge have to be complemented with the scientific knowledge on the conservation of economically important plants and other natural resources so that long-term sustainability of study area could be maintained.

REFERENCES