The impact, uses, and ecological role of agrestals in two selected agroecosystems of Eastern India

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Agricultural fields contain some small plants (weeds) which are known as agrestals. Generally, weeds are perceived as unwanted intruders in agro-ecosystems that compete for resources, reduce yields, and force the use of human labor and technology to prevent crop losses; but not all weeds are undesirable. Some weeds act as valuable agro-ecosystem components. They serve as nutritious foods, and important sources of fodder and medicine. Certain weeds may limit insect damage to crops. These beneficial effects indicate that weeds are not just agricultural pests, but can also play beneficial roles in the human society. So, the main objective of the study is to know about the beneficial agrestals of the district and their roles. Detailed field surveys were made in different blocks of the district to collect data about agrestals and their usefulness. These fields contain various medicinal plants such as Solanum nigrum L., Eclipta prostrata L. Oxalis corniculata L., Rungia pectinata L. etc., edible plant Amaranthus viridis L., ornamental plant Grangea maderaspatana (L.) Poir, and aromatic plant Trachyspermum copticum L. It is clear from the study that these two fields of the district contain some valuable agrestals which are used by the locals.

Key words: Agrestals, agro-ecosystems, weeds, food, fodder, medicine, insects, society.

INTRODUCTION

The common definition of weeds is that they are plants in the wrong place (Harlan and Wet, 1965). Weeds are a permanent constraint to crop productivity in agriculture and they compete for nutrients, space, light, and exert a lot of harmful effects by reducing the quality, as well as quantity of the crop, if the weed populations are left uncontrolled (Kavaliauskaite and Bobinas, 2006). Literally, agrestal means agricultural weed (Rao et al., 2008). Weeds are not always undesirable. In many systems, particularly in the tropics, weeds are useful elements in agricultural systems. Certain weeds have been shown to increase the profitability of a system (Showler and Reagan, 1991). However, not all weeds have a negative effect on the crop, and it is important to consider the individual system when assessing the impact and losses due to weeds in order to determine the ideal treatment (Dutta and Banerjee, 1978). At low densities, weeds often do not affect the yield (Altieri, 1988). The effect of the weed must be assessed. In many areas, weeds have both positive and negative effects. It is often possible to leave weeds with the crop for a certain period of time, the period threshold before using control methods (Dwari and Mondal, 2011).

MATERIALS AND METHODS

Detailed field surveys of (Momordica charantia L. and Cucurbita maxima L.) were made in different places of Howrah District (Figure 1) following blocks during 2010 to 2011: Udaynarayanpur, Amta I and II, 22.34°N latitude and 88.0°E longitude; Bagnan I and II, 22.47°N latitude and 87.97°E longitude; Uluberia I and II, 22.47°N latitude and 88.1°E longitude; Bali-jagacha, 22.65°N latitude and 88.34°E longitude; Domjur, 22.64°N latitude and 88.22°E longitude; Panchla, 22.54°N latitude and 88.14°E longitude; Sankrail, 22.58°N latitude and 88.24°E longitude. The two fields of this district were selected (including all blocks) and thoroughly surveyed. The documentation of agrestals was done during April 2009 to August 2011. The study sites were divided into 2 major groups, that is, one
is agriculturally rich Damodar River associated group and another group was less agriculturally rich. Prior to start of the survey, some random sample areas were selected, which major portion of the area covered. Different data about the usefulness of agrestal were documented from field survey and resourceful persons (farmers and land owners). Collected voucher specimens were deposited in the herbarium of Department of the Botany and Forestry, Vidyasagar University. Weeds were identified with the help of herbarium specimen of different weeds with the help of the experts.

RESULTS

At the end of the detailed study throughout the whole district, it was found that these two fields of this district contain many useful weeds, which can be used directly for human welfare bio-resource or is already used by local peoples. Weeds can be used directly as medicinal, food, fodder, ornamental and other human uses. Out of 23 sp. of agrestals collected from the fields, 16 species possess economic importance in various ways (Table 1). The different uses of these agrestals are medicinal, edible, fodder, ornamental and aromatic which are enumerated as follows:

Medicinal plants

**Dicots**

1) *Oxalis corniculata* L. (Figure 2)
   - Local name: Amrul
   - Family: Oxalidaceae
   - Medicinal uses: Leaves- Used in piles, anaemia, opacities of the cornea and warts (Chetty et al., 2011).

2) *Solanum nigrum* L. (Figure 3)
   - Local name: Kakmachi
   - Family: Solanaceae
   - Medicinal uses: Whole plants used in asthma, bronchitis, diarrhea, heart and kidney disease. Root used in urinary troubles. Leaf is used as a laxative (Joy et al., 1998).

3) *Boerhavia diffusa* L. (Figure 4)
   - Local name: Punarnova
   - Family: Nyctaginaceae
   - Medicinal uses: Whole plants used in anaemia, constipation, arthritis, spurse, diabetes and jaundice (Chetty et al., 2011).
Table 1. Collected and reported plant species of the study area.

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant species name</th>
<th>Local name</th>
<th>Family</th>
<th>Importance</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oxalis corniculata L.</td>
<td>Amrul</td>
<td>Oxalidaceae</td>
<td>Medicinal and Edible</td>
<td>CMF</td>
</tr>
<tr>
<td>2</td>
<td>Solanum nigram L.</td>
<td>Kakmachi</td>
<td>Solanaceae</td>
<td>Medicinal</td>
<td>CMF</td>
</tr>
<tr>
<td>3</td>
<td>Boerhavia diffusa L.</td>
<td>Punarnova</td>
<td>Nyctaginaceae</td>
<td>Medicinal</td>
<td>CMF</td>
</tr>
<tr>
<td>4</td>
<td>Rungia pectinata (L.) Nees.</td>
<td>Chotosibjata</td>
<td>Acanthaceae</td>
<td>Medicinal</td>
<td>MCF</td>
</tr>
<tr>
<td>5</td>
<td>Eclipta prostrata L.</td>
<td>Keshute</td>
<td>Asteraceae</td>
<td>Medicinal</td>
<td>MCF</td>
</tr>
<tr>
<td>6</td>
<td>Grangea maderaspatana (L.) Poir.</td>
<td>Namuti</td>
<td>Asteraceae</td>
<td>Medicinal and ornamental</td>
<td>MCF</td>
</tr>
<tr>
<td>7</td>
<td>Gnaphalium purpureum L.</td>
<td>Kalpahibon</td>
<td>Asteraceae</td>
<td>Edible and ornamental</td>
<td>CMF</td>
</tr>
<tr>
<td>8</td>
<td>Amaranthus viridis L.</td>
<td>Ban notey</td>
<td>Amaranthaceae</td>
<td>Edible</td>
<td>CMF</td>
</tr>
<tr>
<td>9</td>
<td>Alternanthera philoxeroides Griseb.</td>
<td>Danta</td>
<td>Amaranthaceae</td>
<td>Fodder</td>
<td>BOF</td>
</tr>
<tr>
<td>10</td>
<td>Euphorbia hirta L.</td>
<td>Bara dudhe</td>
<td>Euphorbiaceae</td>
<td>Medicinal</td>
<td>CMF</td>
</tr>
<tr>
<td>11</td>
<td>Croton bonplandianum Baill.</td>
<td>Churchuri</td>
<td>Euphorbiaceae</td>
<td>Medicinal</td>
<td>MCF</td>
</tr>
<tr>
<td>12</td>
<td>Portulaca grandiflora Hook.</td>
<td>Bara ionia</td>
<td>Portulaceae</td>
<td>Ornamental</td>
<td>MCF</td>
</tr>
<tr>
<td>13</td>
<td>Cleome viscosa L.</td>
<td>Hurhuria</td>
<td>Capparidaceae</td>
<td>Ornamental</td>
<td>MCF</td>
</tr>
<tr>
<td>14</td>
<td>Trachyspermum copticum L.</td>
<td>Ban Ajwan</td>
<td>Apiaceae</td>
<td>Aromatic</td>
<td>MCF</td>
</tr>
<tr>
<td>15</td>
<td>Dactylotenium aegypticum (L.) Beauv.</td>
<td>Makra</td>
<td>Poaceae</td>
<td>Medicinal</td>
<td>MCF</td>
</tr>
<tr>
<td>16</td>
<td>Cynodon dactylon (L.) Pers.</td>
<td>Durba</td>
<td>Poaceae</td>
<td>Medicinal and fodder</td>
<td>BOF</td>
</tr>
</tbody>
</table>

CMF: Cucurbita maxima L. field, MCF: Momordica charantia L. field and BOF: Present in both field.

Figure 2. Flowering twig of Oxalis corniculata L. (Oxalidaceae).

4) Rungia pectinata (L) Nees. (Figure 5)
Local name: Chotosibjata
Family: Acanthaceae
Medicinal uses: Leaves - Used to cooling, aperient, given to children suffering to small pox; roots - Used to febrifuge (Paria, 2005).

5) Eclipta prostrata (L) (Figure 6)
Local name: Keshute
Family: Asteraceae
Medicinal uses: Leaves - used in jaundice, fever and help to promote hair growth (Joy et al., 1998).
6) *Grangea maderaspatana* (L.) Poir. (Figure 7)
Local name: Namuti
Family: Asteraceae
Medicinal uses: Leaves: Infusion of leaves considered stomachic, antispasmodic and used in irregular menstruation (Chetty et al., 2011).

7) *Euphorbia hirta* L. (Figure 8)
Local name: Bara dudhe

Family: Euphorbiaceae
Medicinal uses: Plant juice used in dysentery; Milk used in removing warts (Paria, 2005).

8) *Croton bonplandianum* Baill. (Figure 9)
Local name: Lankeswari
Family: Euphorbiaceae
Medicinal uses: Leaves - Leaf paste is applied for skin
diseases and wounds and also used to stop bleeding (Bapuji and Ratnam, 2009).

**Monocots**

1) *Dactyloteniun aegyptium* (L) Beauv. (Figure 10)
Local name: Makra
Family: Poaceae
Medicinal uses: Parched grains are administered to women who suffer from stomach ache after child birth (Paria, 2005).

2) *Cynodon dactylon* (L.) Pers. (Figure 11)
Local name: Durba
Family: Poaceae
Medicinal uses: Plant juice is astringent, diuretic, used in dropsy; hysteria, epilepsy etc; Root-decoction is diuretic (Paria, 2005).

**Edible plants**

1) *Amaranthus viridis* L. (Figure 12)
Local name: Ban notey
Family: Amaranthaceae
Uses: Whole plants without root used as vegetable by local peoples.

2) *Gnaphalium purpureum* L. (Figure 13)
Family: Asteraceae
Uses: Young leaves cooked by local peoples.

3) *Oxalis corniculata* L.
Local name: Amrul
Family: Oxalidaceae
Uses: Whole plants without root used after boiled by local peoples.

**Fodder plants**

1) *Cynodon dactylon* (L.) Pers. (Patil and Janagoudar, 1993)
Local name: Durba
Family: Poaceae

2) *Alternanthera philoxeroides* Griseb. (Figure 14)
Local name: Danta
Family: Amaranthaceae

**Ornamental plants**

1) *Portulaca grandiflora* Hook. (Figure 15)
Family: Portulacaceae

2) *Cleome viscosa* L. (Figure 16)
Family: Capparidaceae

3) *Grangea maderaspatana* (L.) Poir.
Family: Asteraceae

4) *Gnaphalium purpureum* L.
Family: Asteraceae
Aromatic plants

1) *Trachyspermum copticum* L. (Figure 17)

Family: Apiaceae
The strong aroma is enhanced by toasting or frying and goes well with potatoes or fish. Legumes (lentils, beans)
Figure 14. Patches of *Alternanthera philoxeroides* Griseb. (Amaranthaceae).

Figure 15. Flowering patches of *Portulaca grandiflora* Hook. (Portulacaceae).

Figure 16. Flowering twig of *Cleome viscosa* L. (Capparidaceae).

Figure 17. Flowering twig of *Trachyspermum copticum* L. (Apiaceae).

are, however, the most important field of application. In India, where these vegetables are popular, since they provide a source of protein to the many vegetarians, they are commonly flavored with a perfumed butter frequently containing ajwain. It has a characteristic aromatic smell and pungent taste, and is widely used as a spice in
curries. Its seeds are used in small quantities for flavouring numerous foods, as preservatives (Kaur and Arora, 2010).

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DISCUSSION

The whole survey thus reveals that these two fields contain many useful agrestals, which can be used as bio-resource for human welfare and some are already used by local peoples. The present study is the first that documented beneficial agrestals of these fields from this district. In West Bengal, one work by Dutta and Banerjee in 1978 was done from Hooghly and undivided Midnapore district on rice field, and they documented 124 economic important plants (Dutta and Banerjee, 1978). Local drug collectors of this district can use these fields for collection of various medicinal (10 species) plants. People can collect these edible (3 species), fodder (2 species) and ornamental plants (4 species) for their preliminary uses. Documented plants are represented in Table 1 to understand the overall structure and function of this study area at a glance and also to get an accurate and precise information of the reported plant species. Among three food plants of these fields, uses of *A. viridis* L. and *O. corniculata* L. are very high in that district. In the fields of this district, the families Asteraceae and Poaceae are the dominant families in dicots and monocots, respectively (Figure 18). In this district, it was found that people always try to make some new ornamental plants from wild plants. *G. maderaspatana* (L.) Poir. and *G. purpureum* L. are two wild plants used as ornamental plants in this district.

*T. copticum* L. is a very important aromatic plant also found in the *Momordica charantia* L. field. So from this study, it is clear that in low density these weeds are valuable and up to a certain level there is no requirement
to remove these weeds for ecological sustainability.

REFERENCES


