A B R
P-ISSN 0976-4585
E-ISSN 2277-1573

ADVANCES IN BIORESEARCH
Volume 4 [1] March2013:143-153

[ISO 9001: 2008 Certified Organization]
Website: http://www.soeagra.com/abr/abr.htm

ORIGINAL ARTICLE

Assessment of Valuable Agrestals Diversity in Sesame field of Howrah District, West Bengal, India

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ABSTRACT

Agrestals are small plants (weeds) growing in the agricultural fields. Generally weeds are plants said to grow where they are not wanted. The ecological role of weeds can be seen in very different ways. In one side they compete with crops for water, nutrients, light, space and force the use of large amounts of human labour and technology to prevent even greater crop losses but in another side weeds can be viewed as valuable agro ecosystem components that provide services complementing those obtained from crops. In many agricultural systems, weeds are very useful source of different purposes. They serve as nutritious foods, 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. Sesame is a one of the major crop field of this district so, this field contain several agrestals. The main objective of the study is to know about the beneficial agrestals of the sesame fields of this district and their roles. The details field surveys reveal that the fields contain 12 medicinal plants, 4 edible plants and 2 fodder plants are found. A stratified random quadrate method was employed in the study. Among medicinal plants Dactylotenium aegyptium (L) Beauv., Cynodon dactylon (L.) Pers., Eleusine indica (L.) Gaertn., Celosia argentea L., Portulaca oleracea L., Ipomoea quamoclit L. and Phyllanthus fraternus Webster, among edible plants Amaranthus viridis L. and among fodder plants Alternanthera philoxeroides Griseb. showed the higher density and frequency. It is clear from the study that these two fields of the district contain some valuable agrestals which also used by local peoples.

Key words: *Agrestals, unwanted, sesame, valuable, medicinal, edible and fodder.*

Received 20.02.2013 Accepted 1303.2013

INTRODUCTION

One of the oldest problems in agriculture since about 10000 B.C. is weeds and act as one of the main limiting factors in crop production [(1)] . Humans always judge the weeds are the plant to be not of use and undesirable at a place where it grows [(2)]. Literally agrestal means agricultural weed [(3)]. Major competition takes place for nutrients, space and light by uncontrolled weeds with the crop plants and they cause of some harmful effects by decreasing the quality and quantity of the main crop [(4)]. But weeds are not always undesirable. They are also useful elements in agroecosystems, particularly in tropics. Many weeds have been shown to increase the profitability of a system [(5)]. Now it is realize that not all weeds have a negative effect on the main crop, and it is necessary to consider the individual system when assessing the impact and losses due to weeds in order to prepare a better treatment [(6)]. Proper assessment on the effect of weeds is requiring because in many areas, they have both beneficial and harmful effects. In an ideal system it is often possible to leave weeds within the threshold level with the crop for a certain period of time, [(7)]. At low densities they have no effect on the yield [(8)].

MATERIALS AND METHOD

Study area

The details field surveys in sesame (*Sesamum indicum* L.) fields were made in different places of Howrah district (Fig.1) following blocks during 2010 – 2011: Udaynarayanpur, Amta I & II, 22.34°N latitude and 88.0°E longitude; Bagnan I & II, 22.47°N latitude and 87.97°E longitude; Uluberia I & II, 22.47°N latitude and 88.11°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.

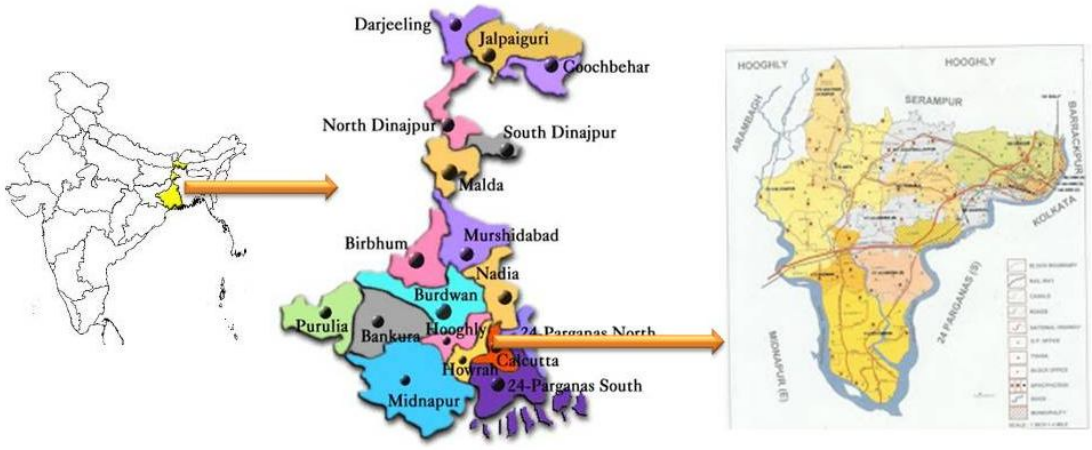


Figure 1. Howrah district, West Bengal of India (study area).

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. Different sesame fields of blocks of this district were surveyed during April 2009 to February 2011. The study sites were classified into 2 groups, one is agriculturally rich and another one is less agriculturally rich area. Howrah is a district of the West Bengal state in eastern India. The Area of Howrah is 467 km^2. The Howrah district lies between 22°48′ N and 22°12′ N latitudes and between 88°23′ E and 87°50′ E longitudes. Boundaries of the district are naturally determined by Rupnarayan River on west and south-west, and by Bhagirathi-Hooghly river on east and south-east side. On north side, the boundary is an artificial one except for Bally Canal on north-east and Damodar River on north-west. Annual normal rainfall is 1461 millimetre per year. Annual maximum temperature varies between 32-39°C, whereas minimum temperature varies between 8-10°C.

Methods

In the following study, quantitative structure and diversity of Plants were calculated. The study was carried out through stratified random quadrate method. 2m x 2m sample plots were nested for plants. Within each plot the number and name of all the herbs were counted and recorded. Densities (D), frequency (F), abundance (A) were calculated through [9]. In the present study, Shannon Wiener diversity index and abundance frequency ratio (A/F) were also calculated.

The Shannon Wiener diversity index

One of the most commonly used measures of species diversity is the Shannon Wiener diversity index. It combines two quantifiable measures; 1. the species richness (the number of species in the community) and 2. species equitability (how even are the numbers of individuals of each species). The higher the number, the higher is the species diversity. The

Shannon Wiener index for diversity was calculated according to [10] and it is as follows:

$H = \Sigma PiLnPi$

Where, H = Index of species diversity

Abundance frequency ratio (A/F)

The ratio of abundance to frequency (A/F) for shrub and herb species was determined for eliciting the distribution pattern. This ratio has indicated regular (<0.025), random (0.025-0.05) and contagious (>0.05) distribution patterns [11].

RESULTS AND DISCUSSION

In the present study, 19 species of herbs under 12 families were identified. The family Poaceae among monocot and Amaranthaceae from dicot dominated containing five and four species respectively. Rest

of the families were represented by one species each (Table 1). A similar study was conducted by [6] in Medinipur and Hoogly district recorded 124 species of plants. Among the 19 weed species 12 species has medicinal properties [12], some are already used by common peoples. Four food plants and three fodder plants were found.

Quantitative analysis of herbs

With respect to the all species, highest density was measured among monocot in *Cynodon dactylon* (4.143/4m^2) followed by *Sporobolus diandrus* (3.714/4m^2) , *Digitaria sanguinalis* (2.286/4m^2) and *Amaranthus viridis* (2.286/4m^2), *Celosia argentea* (2.142/4m^2) among dicot. On the contrary, lowest density was calculated in *Cleome viscosa* (0.286/4m^2). However, the highest frequency was measured in *Cynodon dactylon* (100%) followed by *Amaranthus viridis* (87.5%), *Celosia argentea* (87.5%), *Cyperus rotundus* (87.5%) and *Sporobolus diandrus* (85.714%). In contrast, the lowest frequency was showed by *Physalis minima* (28.571%), *Cleome viscosa* (28.571%) and *Oldenlandia corymbosa* (28.571%). Furthermore, the highest abundance was found in *Sporobolus diandrus* (4.333) followed by *Cynodon dactylon* (4.142) and *Dactylotenium aegypticum* (3.25) whereas the lowest was calculated in *Physalis minima* (1.5), *Cleome viscosa* (1). A/F ratio in the study site indicated random to contagious distribution pattern. According to previous research [13], the study area was not completely uniform because of several species showed contagious distribution (Table 2).

Shannon Wiener diversity index of plant species in the study area

Generally, measurement of biodiversity typically concentrates on the species level and species diversity is one of the most important indices which are used for the evaluation of ecosystems at different scales [14]. A rich ecosystem with high species diversity has a large value of H, while an ecosystem with little diversity has a low H. In the study site, Shannon Wiener diversity index was 2.719.

Figure. 2. *Dactylotenium aegypticum* (L.)Beauv.

Figure. 3. *Eleusine indica* (L.) Garten.

Figure. 4. *Sporobolus diandrus* (Retz.) P.Beauv.

Figure. 5. *Digitaria sanguinalis* (L.) Scop.

Figure. 6. *Cleome viscosa* L.

Figure.7. *Oldenlandia corymbosa* L.

Figure.8. *Commelina benghalensis* L.

Figure.9. *Physalis minima* L.

Figre.10. *Scoparia dulcis* L.

Figure.11. *Phyllanthus fraternus* Webster

Figure.12. *Celosia argentea* L.

Figure.13. *Ipomoea quamoclit* L.

Figure.14. *Alternanthera sessilis* Dc.

Figure.15. *Mollugo spergula* L.

Figure.16. *Amaranthus viridis* L.

Figure.17. *Portulaca oleracea* L.

Figure.18. *Cyperus rotundus* L.

Figure.19. *Cynodon dactylon* (L.) Pers.

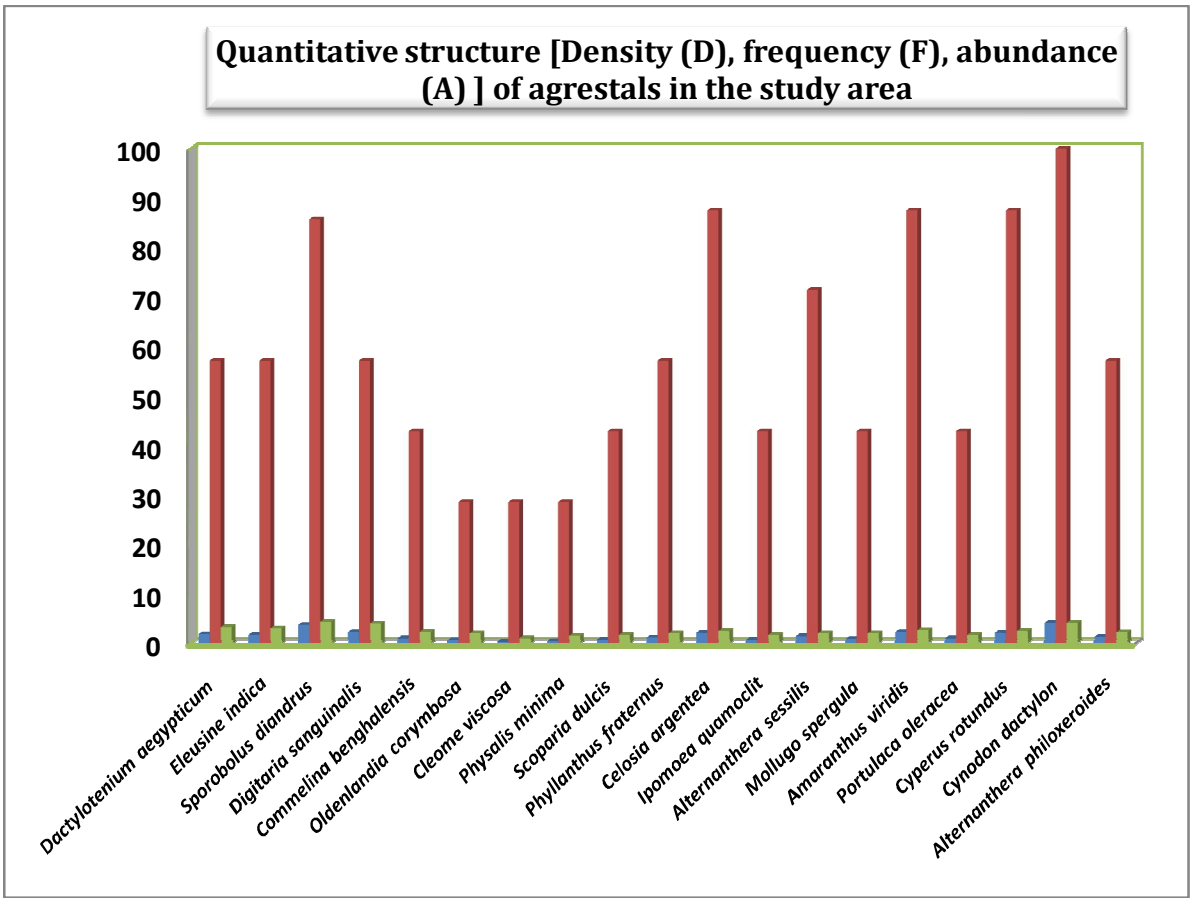
Figure.20. *Alternanthera philoxeroides* Griseb.

Table 1: Composition of herbs in the study area

No.	Local name	Scientific name	Family	Importance
1	Makra	*Dactylotenium aegypticum* (L.)Beauv.	Poaceae	Medicinal
2	Goosegrass	*Eleusine indica* (L.) Garten.	Poaceae	Medicinal
3	Suri	*Sporobolus diandrus* (Retz.) P.Beauv.	Poaceae	Medicinal
4	Crabgrass	*Digitaria sanguinalis* (L.) Scop.	Poaceae	Medicinal
5	Hurhuria	*Cleome viscosa* L.	Capparidaceae	Medicinal
6	Snake needle grass	*Oldenlandia corymbosa* L.	Rubiaceae	Medicinal
7	Kanchira	*Commelina benghalensis* L.	Commelinaceae	Medicinal
8	Ban tepari	*Physalis minima* L.	Solanaceae	Medicinal
9	Ban dhone	*Scoparia dulcis* L.	Scrophulariaceae	Medicinal
10	Bhui amla	*Phyllanthus fraternus* Webster	Euphorbiaceae	Medicinal
11	Sadamurgi	*Celosia argentea* L.	Amaranthaceae	Medicinal
12	Tarulata	*Ipomoea quamoclit* L.	Convolovulaceae	Medicinal
13	Sanchi	*Alternanthera sessilis* Dc.	Amaranthaceae	Edible
14	Gima	*Mollugo spergula* L.	Aizoaceae	Edible
15	Ban notey	*Amaranthus viridis* L.	Amaranthaceae	Edible
16	Bara lonia	*Portulaca oleracea* L.	Portulacaceae	Edible
17	Motha	*Cyperus rotundus* L.	Cyperaceae	Fodder
18	Durba	*Cynodon dactylon* (L.) Pers.	Poaceae	Fodder
19	Danta	*Alternanthera philoxeroides* Griseb.	Amaranthaceae	Fodder

Table 2: Quantitative structure of herbs in the study area

No.	Scientific name	D/4m²	F (%)	A	A/F
1	*Dactylotenium aegypticum* (L.)Beauv.	1.857	57.142	3.25	0.057
2	*Eleusine indica* (L.) Garten.	1.714	57.142	3	0.052
3	*Sporobolus diandrus* (Retz.) P.Beauv.	3.714	85.714	4.333	0.05
4	*Digitaria sanguinalis* (L.) Scop.	2.286	57.142	4	0.07
5	*Commelina benghalensis* L.	1	42.857	2.333	0.054
6	*Oldenlandia corymbosa* L.	0.571	28.571	2	0.07
7	*Cleome viscosa* L.	0.286	28.571	1	0.035
8	*Physalis minima* L.	0.429	28.571	1.5	0.052
9	*Scoparia dulcis* L.	0.714	42.857	1.666	0.039
10	*Phyllanthus fraternus* Webster	1.142	57.142	2	0.035
11	*Celosia argentea* L.	2.142	87.5	2.5	0.029
12	*Ipomoea quamoclit* L.	0.714	42.857	1.666	0.039
13	*Alternanthera sessilis* Dc.	1.429	71.428	2	0.028
14	*Mollugo spergula* L.	0.857	42.857	2	0.045
15	*Amaranthus viridis* L.	2.286	87.5	2.666	0.03
16	*Portulaca oleracea* L.	1	42.857	1.666	0.039
17	*Cyperus rotundus* L.	2.143	87.5	2.5	0.029
18	*Cynodon dactylon* (L.) Pers.	4.143	100	4.142	0.041
19	*Alternanthera philoxeroides* Griseb.	1.286	57.142	2.25	0.039



Graph1. Density (D), frequency (F), abundance (A) of agrestals in all families.

CONCLUSION

The details survey reveals that this field contain many valuable agrestals, which we could use as bioresource and some are already used by local peoples. Local drug collectors can use this field for collection of various medicinal (12 species) plants. They can collect these edible (04 species) and fodder (03 species) plants for their primary uses. Documented plants are representing through Table 1 to understand the overall structure and function of this study area at a glance also get accurate and precise information of the reported plant species. Among four food plants of this field, density and frequency of

Amaranthus viridis L. is very high in that district. In this field Poaceae and Amaranthaceae are the dominant families from monocot and dicot respectively (Graph 1). So, from this study it is clear in low density of these weeds are valuable and up to certain level there is no requirement to remove these weeds for ecological sustainability. So, creating awareness among the local people about proper utilization of valuable weeds and their scientific management can contribute significantly to enhance the income of poor farmers.

ACKNOWLEDGEMENT

I want to convey my gratitude to the honourable supervisors Professor Amal Kumar Mondal, Associate professor of Botany, UGC-DRS-SAP-Department, Department of Botany and Forestry, Vidyasagar University, West Bengal, India and Dr. Sanjukta Mondal (Parui), Associate Professor, WBES, DST-FIST College, DBT-Centre for Excellence and UGC-Star College, Department of Zoology, Lady Brabourne College, Kolkata-700017, West Bengal, India, for their consistence help during my study period. I would like to express my thanks to all senior, junior research scholars and friends for their continuous help. I am also thankful to my parents for their support me constantly.

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