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Survey and documentation of the Weed Flora in NBU Garden of Medicinal Plants

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Abstract

Weeds are the plants with generally undesirable properties. They spread rapidly and competitively. When it grows in garden it reduces air flow in garden, keeping plants wetter and more prone to pathogens. They are unattractive and can cause health problems such as Hay fever, skin rashes, etc. It also affects quality of product and income of grower. Traditionally, weed control in India has been largely dependent on manual weeding. Understand weed ecology, biology and using information technology should be part of developing and disseminating effective, economical and ecologically advantageous in India. Some weeds release nitrogen from root nodules into soil which automatically add fertilizer into the soil. A survey was conducted in NBU Garden of Medicinal Plants in West Bengal to identify most common and prevalent weeds associated with medicinal plants. A total of 86 different weed species belong to 25 families were identified of which 53 annual and 32 perennial. Among the most abundant weed species are *Axonopus compressus*, *Eleusine indica*, *Cyperus rotandus*, *Cyperus haspan*, *Kylinga brevifolia*, *Melastoma malabathricum*, *Osbeckia nepalensis*, *Nicotiana plumbaginifolia*, *Persicaria orientalis*.

***Keywords**:* Weeds, Soil erosion, Medicinal Plants, MPCA.

Introduction

A weed is a plant considered as undesirable in a particular situation, "a plant in the wrong places". Taxonomically, the term weed has no botanical significance, because a plant that is a weed in one context is not a weed when growing in a situation where it is in fact wanted and where one species of plant is a valuable crop plant, another species in the same genus might be a serious weed such as a wild bramble growing among cultivated loganberries. Weeds not only reduce yield by competing for available nutrients but harbor the pathogen which is harmful to the crops. They harbor rodents, insects, pests' disease and provide ideal conditions for their shelter and proliferation.

There is general agreement about the necessity to remove weeds from cultivated stands of Medicinal plants, and almost all technical papers providing indications for cultivation clearly state that Medicinal plant fields must be kept weed free as much, and as long, as possible. DE la Fuente et al. (2003) demonstrated

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that on biomass and seeds yield of coriander, especially under poor soil conditions, weeding had a greater effect than did fertilization. Furthermore, the absence of weeds from herbal products is mandatory in order to declare their high quality, irrespective whether they come from cultivation or wild collecting (FAH 2003). Yet, a surprisingly reduced number of works have been expressly addressed to the evaluation of the effects that weeds may exert on Medicinal Plants. Studies about this topic are scattered in the world literature, and very rarely the argument is treated in detail. Medicinal plants have the distinguishing property to be graded by the market according to their content in active components, i.e., the special metabolites that confer to them their medicinal properties. In many cases, these metabolites are synthesized by plants under environmental stress conditions; as competition with weeds is a special and often severe cause of stress, it should be argued that the best conditions for producing medicinal metabolites would be under weedy conditions.

The campus of NBU is quite rich itself with the record of over 700 plants. One *ex-situ* conservatory was established in the North Bengal University (NBU) campus in the year 1998. The garden was earlier named as "Garden of Medicinal Plants, NBU" and presently it is renamed as "*Centre for Aromatic and Medicinal Plant Garden*". The Garden has been developed with this basic floristic background and that is why a good number of medicinal and aromatic plants are growing here naturally. The garden of medicinal and aromatic plants housing several species of plants that are brought from various parts like MPCAs of West Bengal, Western Ghats, Eastern Ghats, central and Gangetic plains, North East India and various attitudinal ranges of entire Himalaya and successfully introduced time to time. It is spread over an area of 5 acre and is with well boundary. Different species of weeds which are growing in the garden along with the medicinal plant cause harmful effect to not only the garden plants but also to human health as well as cattle. Therefore, the present study was undertaken to investigate the distribution, severity and to understand the importance of the weed flora prevailing in the medicinal plant garden of University of North Bengal.

Materials and Methodology

Study area

The University of North Bengal was established by Act of the Legislature of West Bengal in 1962 and University Act was revised under West Bengal Act of XXV of 1981 and it came into force with effect from September 16, 1981 The campus occupies an area of about 330 acres 9 km outside Siliguri and Bagdogra Airport in the Terai region of Darjeeling district. The garden lies in 26°42′39″ N latitude and 88°21′18″ S longitude within Darjeeling District. A small river, Magurmari, is flowing through the campus and it divides campus in two halves. 10 small artificial ponds are also present in the Magurmari river valley. Another small river, Lachka on the Western border of the campus makes the main drainage system for the NBU campus. These two rivers are rain-fed and remain almost dry during the dry seasons. The NBU Campus has mixed deciduous type of forest, dominated by Sal, Litsea, Jarul, Sisso, Teak, Palash, Sirish etc. Sal Kunja is a largest and

natural left over forest patch inside the campus, apart from this several small patches of Rubber plantation, tea plantation and several more patches of plantation areas and/or social forestry makes the campus quiet green and clean. The central part of the campus area is covered with savanna type of grassland vegetation, dominated with two species of tall grasses, namely *Cymbopogon pendulus* and *Saccurum spontaneum*. The river valleys are covered with many species of grasses, ferns and other herbaceous flora.

Methodology

Regular surveys were carried out to determine the present status of the weed flora of the garden. Photographs of the plants in their vegetative and reproductive conditions were taken. The specimens were identified with the help of various literatures (Hooker 1872 - 1897; Prain, 1903; Hara, 1966; Ohashi, 1975; Hara et al., 1978, 1979, 1982; Grierson & Long, 1983, 1984, 1987, 1991, 1999, 2001; Noltie, 1994, 2000). For correct nomenclature and family delimitation reliable websites (www.theplantlist.org and www.ipni.org) were principally consulted. For RET (Rare, Endangered and Threatened) status elements Red Data Book for Indian Flora (Nayar and Sastry, 1987, 1990) and the IUCN red list (version 14; 2019) was followed.

Result and Discussion

A total of 86 different weed species representing 53 annuals and 32 perennials, comprising 8 grasses, 4 sedges and 4 broadleaved weeds were identified (Table 1). The annual species was greater in number than perennial species and overall annual grasses were more prevalent than perennial grasses due to lack of satisfactory control measure either cultural or herbicide application. The weed species represented 25 families from surveyed area. Among which Asteraceae family had the highest number of weed species (11), followed by Poaceae (8) Commelinaceae (6), Scrophulariaceae (6), Amaranthaceae (5), Euphorbiaceae (5), Polygonaceae (5), Acanthaceae (4), Cyperaceae (4), Solanaceae (4), Fabaceae (4), Lamiaceae (3), Lythraceae (2), Urticaceae (2), Onagraceae (2). Rests of the families were represented by one species each (Table 1).

Table 1. List of weeds of the NBU Garden of Medicinal Plants. [C= Common, R= Rare, VC= Very Common]

Species	Family	Flowering & fruiting	Distribution	Abundance	Uses
Hygrophila phlomiodes Nees	Acanthaceae	October	SW Asia	-	-
Hygrophila polysperma (Roxb.) T.	Acanthaceae	May - December	India	-	-

Anderson					
Hygrophila ringens (L.) R. Br. ex Spreng.	Acanthaceae	May - December	SW Asia	-	-
Phaulopsis imbricata (Forssk.) Sweet	Acanthaceae	November - March	Tropics	-	-
Alternanthera sessilis (L.) R.Br. ex DC.	Amaranthaceae	September - February	Asia	-	as vegetables
Alternanthera paronychioides A.St.-Hil.	Amaranthaceae	January - December	Native to tropical America	R	-
Amaranthus blitum subsp. *oleraceus* (L.) Costea	Amaranthaceae	June - December	Pantropical	VC	as vegetables
Amaranthus spinosus L.	Amaranthaceae	May - December	Pantropical	C	as vegetables
Amaranthus viridis L.	Amaranthaceae	April - June	Pantropical	VC	as vegetables
Centella asiatica (L.) Urb.	Apiaceae	April - August	-	C	taken locally to cure Dysentery
Acmella calva (DC.) R.K.Jansen	Asteraceae	May - December	SW Asia	C	-
Ageratum houstonianum Mill.	Asteraceae	Throughout the year	Naturalized in India	C	-
Ageratum conyzoides (L.)L.	Asteraceae	Throughout the year	Naturalized in India	C	-
Bidens pilosa L.	Asteraceae	Throughout the year	SW Asia	C	-

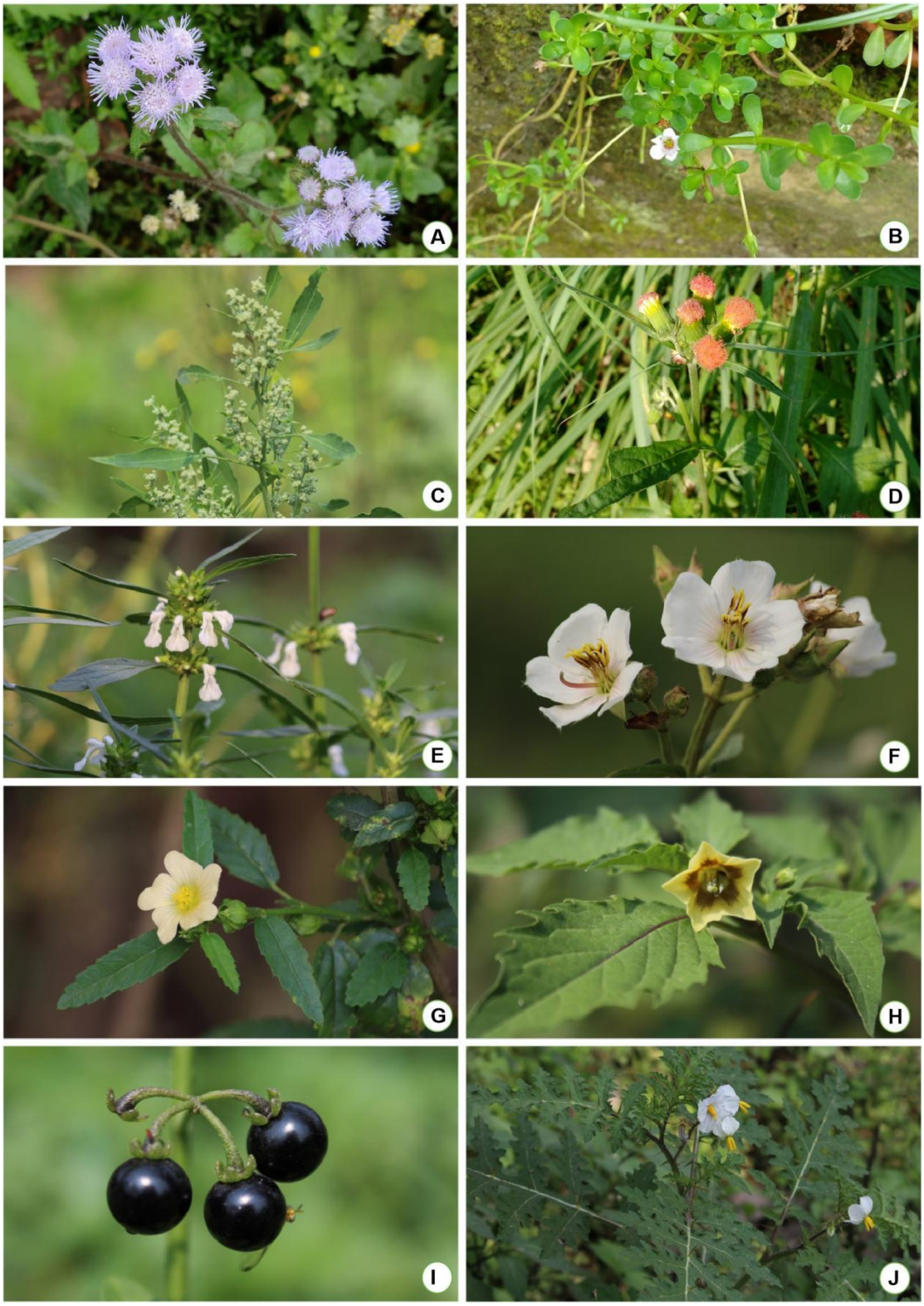
Crassocephalum crepidioides (Benth.) S.Moore	Asteraceae	July - December	SW Asia	C	-
Chromolaena odorata(L.) R.M.King & H.Rob.	Asteraceae	April - December	Naturalized in India	C	-
Emilia sonchifolia(L.) DC. ex DC.	Asteraceae	Throughout the year	SW Asia	C	-
Mikania micrantha Kunth	Asteraceae	Throughout the year	Naturalized in India	VC	-
Cyanthillium cinereum (L.) H.Rob.	Asteraceae	Throughout the year	SW Asia	C	-
Tridax procumbens L.	Asteraceae	November - March	Pantropical	C	-
Youngia japonica (L.) DC.	Asteraceae	April - October	SW Asia	C	-
Diplazium esculentum(Retz.) Sw.	Athyriaceae	July – February	Subtropics	C	as vegetables
*Cleome rutidosperma*DC.	Caparridaceae	July - February	Asia, Africa, America, Australia	-	-
Cleome viscosa L.	Caparridaceae	July - February	Asia, Africa, America, Australia	-	-
Chenopodium album L.	Chenopodiaceae	October - February	Cosmopolitan	-	as vegetables
Amischotolype hookeri(Hassk.) H.Hara	Commelinaceae	June - July	SW Asia	-	-
Commelina diffusa N. L. Burman	Commelinaceae	May - November	Tropics	C	-
Commelina suffruticosa	Commelinaceae	May - December	SW Asia	-	-

Blume					
Commelina benghalensis L.	Commelinaceae	May - December	Tropics	C	-
Cyanotis vaga(Lour.) Schult. & Schult.f.	Commelinaceae	July - October	SW Asia	-	-
Murdannia nudiflora (L.) Brenan	Commelinaceae	January - October	SW Asia	-	-
Bulbostylis densa (Wall.) Hand.-Mazz.	Cyperaceae	April - December	Tropics & sub-tropics	C	-
Cyperus rotundus L.	Cyperaceae	Throughout the year	Cosmopolitan	C	-
Cyperus haspan L.	Cyperaceae	June - September	Cosmopolitan	C	-
Kylinga brevifolia Rottb.	Cyperaceae	Throughout the year	Tropics	C	-
Croton bonplandianus Baill.	Euphorbiaceae	Throughout the year	Pantropical	VC	-
Euphorbia hirta L.	Euphorbiaceae	July - September	Pantropical	Sparce	-
Phyllanthus urinaria L.	Euphorbiaceae	April - November	Pantropical	C	-
*Phyllanthus fraterons*G.L.Webster	Euphorbiaceae	June - September	Pantropical	C	-
Ricinus communis L.	Euphorbiaceae	June - September	Pantropical	C	-
Sauropus quadrangularis (Willd.) Müll.Arg.	Euphorbiaceae	Throughout the year	Pantropical	R	-
Desmodium gangeticum (L.) DC.	Fabaceae	April - November	Asia	-	-
Desmodium trifolium (L.)	Fabaceae	Junuary - February	Asia	-	-

DC.					
Mimosa pudica L.	Fabaceae	March - November	Naturalized in India	-	-
Mimosa diplotricha Wright ex Sauvalle	Fabaceae	May - December	Native to tropical America	-	-
Anisomeles indica(L.) Kuntze	Lamiaceae	August - November	Asia	-	-
Hyptis brevipes Poit.	Lamiaceae	May - December	Tropics	-	-
Leucas zeylanica (L.) W.T.Aiton	Lamiaceae	August - February	SW Asia	-	-
Ammannia baccifera L.	Lythraceae	August - December	Asia, Africa	-	-
Rotala rotundifolia(Buch.-Ham. ex Roxb.) Koehne	Lythraceae	November - January	Asia	-	-
Sida acuta Burm.*f.*	Malvaceae	July - April	Asia	-	-
*Sida rhombifolia*L.	Malvaceae	July - April	Asia	-	-
Marsilea minuta L.	Marsileaceae	January - April	Asia, Africa	C	as vegetables
*Osbeckia nepalensis*Hook.f.	Melastomataceae	August - December	Asia	-	-
Melastoma malabathricum L.	Melastomataceae	Throughout the year	Tropics	-	-
Glinus oppositifolius(L.) Aug. DC.	Molluginaceae	March - July	Africa, Asia, Australia	C	-
Ludwigia octovalvis(Jacq.) P.H.Raven	Onagraceae	May - December	India	-	-

Ludwigia perennis L.	Onagraceae	July - November	Asia	-	-
Axonopus compressus (Sw.) P.Beauv.	Poaceae	August - December	Native to tropical America	VC	-
Chrysopogon aciculatus (Retz.) Trin.	Poaceae	June - October	Asia to Pacific	C	-
Cynodon dactylon (L.) Persoon	Poaceae	July - November	Tropics	VC	-
Dactyloctenium aegyptium (L.) Willd.	Poaceae	May - October	Tropics & sub-tropics	C	-
Eleusine indica (L.) Gaertn.	Poaceae	June - October	Tropics & sub-tropics	C	-
Imperata cylindrica (L.) P.Beauv.	Poaceae	April - August	Tropics	C	-
Panicum humile Steud.	Poaceae	August - December	Tropics & sub-tropics	C	-
Panicum repens L.	Poaceae	January - December	Tropics & sub-tropics	C	-
Persicaria hydropiper (L.) Spach	Polygonaceae	May - August	-	Sparce	-
Persicaria orientalis (L.) Assenov	Polygonaceae	July - September	Pantropical	C	-
Parsicaria tenella (Blume) Hara	Polygonaceae	May - September	Pantropical	C	-
Rumex dentatus L.	Polygonaceae	April - October	India	-	-
Rumex maritimus L.	Polygonaceae	April - October	India	-	-
Portulaca oleracea L.	Portulacaceae	January - December	Pantropical	C	-
Mitracarpus verticillatus(Schum. & Thorn.)	Rubiaceae	January - December	Tropics	C	-

Vatke					
Bacopa monnieri (L.) Pennell	Scrophulariaceae	August - November	SW Asia	-	-
Limnophila heterophylla (Roxb.) Buchanan & Hamilton	Scrophulariaceae	August - November	SW Asia	-	-
Torenia crustacea (L.) Cham. & Schltdl.	Scrophulariaceae	August - May	SW Asia	-	-
Bonnaya antipoda (L.) Druce	Scrophulariaceae	August - May	Tropics	-	-
Mazus pumilis (Burm.f.) Steenis	Scrophulariaceae	April - October	Asia	-	-
Scoparia dulsis L.	Scrophulariaceae	June - May	Asia	-	-
Nicotiana plumbaginifolia Viv.	Solanaceae	March - November	India	C	-
Physalis angulata L.	Solanaceae	April - January	SW Asia	-	-
Solanum nigrum L.	Solanaceae	November - March	SW Asia	-	-
Solanum sisymbrifolium Lam.	Solanaceae	January - December	Asia, Africa, America, Australia	-	-
Gonostegia triandra (Blume) Miq.	Urticaceae	January - September	Asia, Australia	C	-
Pouzolzia zeylanica (L.) Benn.	Urticaceae	September - April	Asia	C	-
Phyla nodiflora (L.) Greene	Verbenaceae	January - December	Pantropical	-	-



A. *Ageratum conyzoides* **B.** *Bacopa monnieri* **C.** *Chenopodium album* **D.** *Crassocephalum crepidioides* **E.** *Leucas indica* **F.** *Osbeckia nepalensis* **G.** *Sida acuta* **H.** *Physalis minima* **I.** *Solanum nigrum* **J.** *Solanum sisymbrifolium*

Conclusion

Weeds are unwanted to human controlled setting. While the weed is generally has a negative connection to the other plants. But most of the weeds are not dangerous, they gives economic and medicinal use also. Weeds are socially benefitted plants. They give beneficial properties and most of the collected species gives more medicinal used for curing diseases. Some beneficial aspects of weeds and are used as edible purpose such as their parts like leaves, roots, fruits, may be used for making medicine. Some weeds attract insects, which may protect other plants from harmful pests. Weeds may also act as 'living mulch' i.e. providing ground cover that reduces moisture loss and prevents erosion. Weeds may also improve soil fertility.

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Reference

de la Fuente EB, Gil A, Lenardis AE, López Pereira M, Suárez SA, Ghersa CM, Yaber Grass M., 2003. Response of winter crops differing in grain yield and essential oil production to some agronomic practices and environmental gradient in the Rolling Pampa, Argentina. Agric Ecosyst Environ 99:159–169.

FAH—Forschungsvereinigung der Arzneimittel-Hersteller e.V., 2003. Standard operating procedures for inspecting cultivated and wild crafted medicinal plants. J Herbs Spices Med Plants 10 (3):109–125.

Grierson, A.J.C., Long, D.G., 1983, 1994, 1987. Flora of Bhutan. Vol. 1, Parts 1, 2 & 3. Royal Botanical Garden, Edinburgh.

Grierson, A.J.C., Long, D.G., 1991, 1999, 2001. Flora of Bhutan, Vol. 2, Parts 1, 2 & 3. Royal Botanical Garden, Edinburgh.

Hara, H., 1966. Flora of Eastern Himalaya. Tokyo University, Tokyo.

Hara, H., Chater, A.Q., Williams, L.H.J., 1982. An Enumeration of the Flowering Plants of Nepal. Vol. III. British Museum of Natural History, London.

Hara, H., Stearn, W.T., Williams, L.H.J., 1978. An Enumeration of the Flowering Plants of Nepal. Vol. 1. British Museum of Natural History, London.

Hara, H., Williams, L.H.J., 1979. An Enumeration of the Flowering Plants of Nepal. Vol. II. British Museum of Natural History, London.

Hooker, J.D., 1872 - 1897. The Flora of British India, Vols 1-7. L. Reeve & Co. Ltd., Ashford, Kent, London.

Nayar, M.P., Sastry, A.R.K., 1987. 1990. Red Data Book of Indian Plants, Vol. 1 & 3. Botanical Survey of India, Calcutta, India.

Noltie, H.J., 1994. 2000. Flora of Bhutan Vol. 3 Parts 1 & 2. Royal Botanical Garden, Edinburgh.

Ohashi, H., 1975. The Flora of Eastern Himalaya, 3rd Report, Tokyo University, Tokyo.

Prain, D., 1903. Bengal Plants. Vol. I & II. West, Newman & Co., London.