

Study on the Cyperaceous weeds of Bangladesh Agricultural University campus

A.K.M. Golam Sarwar and A.K.M. Azad-Ud-Doula Prodhan

Department of Crop Botany, Bangladesh Agricultural University, Mymensingh. E-mail: drsarwar@bau.edu.bd

Abstract: A taxonomic study has been carried out to study the species diversity and phenology of the Cyperaceous weeds existed in the Bangladesh Agricultural University campus. A total of 41 species belonging to 11 genera has been collected and studied. Among these genera, five are monotypic. Some of these are obnoxious weeds of crop field. The knowledge on the flowering period of these plants recorded here will help in the management practices of Cyperaceous weeds of this campus as well as the country as a whole. A good number of these species have medicinal values and other economic uses. Therefore, the development of improved cultivation procedures might be helpful for getting high economic benefits from Cyperaceous weeds without hampering our agro-ecosystem and crop yield.

Key words: Cyperaceae, weed, phenology, Bangladesh Agricultural University Campus.

Introduction

Cyperaceae is a cosmopolitan family with ca. 5000 species and 100 genera (Ball *et al.*, 2002). Members of Cyperaceae, commonly called sedges, are monocot flowering plants with reduced, mostly wind-pollinated (anemophilous) flowers. They have various taxonomic as well as economic, ethnobotanical and horticultural importance, and are quite abundant in Bangladesh Agricultural University (BAU) Campus. The BAU campus falls under Mymensingh district and is about 56.00 km away from Garo Hills. It comprises an area of 486 ha and roughly the whole area can be divided in three main topographic types – basin shaped low lying area, slightly undulated area and plain area, which gives a fairly wide range of habitat for the growth of different types of weeds including sedges. There were also some water bodies-ponds, marshy-lands etc. in different location within the area. The soil type of the area varies from clay, clay-loam to sandy-loam (UNDP, 1988). The temperature ranges from 11.9°C to 32.5°C and average annual rainfall is 244.15 mm. Most of the area is under cultivation for different seasonal crops and vegetables. The lawn, play ground and fallow lands are covered by various types of sedges, grasses and other plants.

Weeds are one of the most important components of agricultural ecosystems. There is little doubt that weeds cause severe economic losses, but placing an exact value on their impact worldwide is difficult, especially in natural or nonagricultural areas. Economic losses result from interference or competition with crops and forests and the costs of pest-control chemicals, fuel, equipment, labor, cultural-control practices, and additional irrigation and fertilizer (Chandler and Cooke, 1992). Additional costs to human and animal health (i.e., allergies and toxins) are more difficult to estimate, but weeds, including sedges, cause substantial indirect economic losses worldwide and Bangladesh as well. However, the detail taxonomic studies of weeds of Bangladesh are neglected by both the practicing plant taxonomists and/or the agricultural scientists. About 25% of the world's weeds are monocots, and sedges are among the most troublesome and difficult to control (Bryson and Carter, 2008). In spite of the abundance of sedges in BAU campus, no significant taxonomic work on sedges of this locality has been done in the recent years. The most significant research work entitled "The Sedges of the East Pakistan (presently Bangladesh) Agricultural University Campus" was carried out in early seventies (Anwer, 1971) and thereafter some references about the occurrences of some sedges have been made in different crop lands (Mamun, 1989; Islam, 2009 and older references therein).

Therefore, the present investigation aimed at making an intensive taxonomic study of the cyperaceous weeds in the Bangladesh Agricultural University Campus. The present article is a synthesis of this work.

Materials and Methods

The present work is based mainly on the fresh materials collected by the first author through the year round frequent field visits. Some fresh materials were also collected and identified by Late Prof. Dr. M. Arshad Ali. The specimens are preserved in the Bangladesh National Herbarium, Dhaka. The major floristic works consulted were Clark (1893, 1894), Prain (1903), Kern (1974) and Uddin (2007). The information regarding common name (if any), flowering period, and economic importance (if any) other than weed has been presented in Table 1.

Results and Discussion

A total of 41 species under 11 genera of Cyperaceous weeds are found in BAU campus (Table 1). Among the genera, the *Fimbristylis* and *Cyperus* with 12 species each can be considered the most dominant, followed by *Eleocharis* (4), and *Pycneus* (4), since these four genera together account for more than two-third of the total number of Cyperaceous weed in the BAU campus. Out of the 11 identified genera, 5 are monotypic i.e., represented by only one species each. The result of present investigation revealed that some of these plants are common and major weeds in the rice, jute and other crop fields (Anwer, 1971; Mamun, 1989; Islam, 2009). However, some of these have other uses viz., fodder, medicinal value, raw materials for small industries, etc. (Table 1). The total number of species is unchanged, although, a few species have become extinct and/or newly introduced (Anwer, 1971). Sometimes the taxonomic status has been redefined or changed over the period of time.

The most important cyperaceous weeds in terms of their adverse effect on agriculture include *Cyperus rotundus* L., *C. difformis* L., *C. iria* L., and the *Fimbristylis miliacea* (L.) Vahl/*F. dichotoma* (L.) Vahl complex, ranking first, 32nd, 33rd, and 40th among the world's worst weeds, respectively (Bryson and Carter, 2008). All of them are present in BAU campus (Table 1). The management practices for weedy sedges are diverse. Cultural methods viz. hand removal, hoeing and draft plowing are still used in much of the world to control weeds including sedges (Shear, 1985). The flowering period of Cyperaceous weeds showed a wide range of variations (Table 1). Cultural practices such as mowing alone will not

effectively control certain perennial sedge weeds, but it can prevent seed production if mowing intervals are shorter than the time required to set fertile achenes (Shear,

1985). Therefore, we can manage the weed populations below the critical level if we take proper steps to uproot the plants before flowering.

Table 1. Cyperaceous Weeds recorded in the Bangladesh Agricultural University Campus

| Botanical Name | Common Name | Flowering Period | Economic Importance |
|----------------------------------------------------------------------------------------|------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Actinoscirpus grossus</i> (L. f.) Goetgh. & D.A. Simpson | – | July to November | It may be used as mat and basket making, Tubers given in diarrhea and vomiting. |
| <i>Bolboschoenus maritimus</i> (L.) Palla subsp. <i>affinis</i> (Roth) T. Koyama | – | March to May | |
| <i>Cyperus babakan</i> Steud. | – | April to June | |
| <i>C. compactus</i> Retz. | – | November to December | |
| <i>C. compressus</i> L. | Chaucha | May to July | |
| <i>C. corymbosus</i> Rottb. var. <i>longispiculatus</i> (O. Ktze.) Kük. | Gola methi | July to October | Used for mat, hat and basket making. Rhizome may be used for scent preparation. |
| <i>C. difformis</i> L. | Sabuj nakful/ Behua | May to June August to December | May be used as fodder. |
| <i>C. flavidus</i> Retz. | Khudey patai | May to November | Used as fodder for cattle. |
| <i>C. iria</i> L. | Bara chaucha | May to October | Used as fodder. Used for mat making, plant has medicinal value. |
| <i>C. laxus</i> Lamk. var. <i>laxus</i> | – | October to December | Its tuber used for stomach, stimulant for heart. Used as fodder for cattle. |
| <i>C. michelianus</i> (L.) Link. | Chhoto gotubi | May to July | |
| <i>C. pilosus</i> Vahl | Shakta khagra/ Uha | July to December | |
| <i>C. platystylis</i> R.Br. | – | November to February | Plant may be used for mat, basket and hat making. |
| <i>C. rotundus</i> L. | Motha | Ranges through the year | Rhizome of this plants yields essential oil and also used for cloth dying purpose. Roasted rhizome in some places used as substitute for coffee. Rhizome has medicinal value also. |
| <i>Eleocharis atropurpurea</i> Kunth | Pani chaise | November to January | |
| <i>E. geniculata</i> (L.) Roem. & Schult. | ” | September to November | |
| <i>E. palustris</i> (L.) R. Br. | ” | January to March | |
| <i>E. plantaginea</i> R.Br. | ” | August to September | Cultivated and used for basket work in Indonesia, may be used in mat making. |
| <i>Fimbristylis acuminata</i> Vahl | – | June to October | May be used as fodder. |
| <i>F. aestivalis</i> (Retz.) Vahl | – | March to May | |
| <i>F. dichotoma</i> (L.) Vahl subsp. <i>dichotoma</i> | Jaina chaise | April to June | |
| <i>F. diphylla</i> (Retz.) Vahl var. <i>depauperata</i> (R.Br.) Clarke | Bara nirbishi | May to July | |
| <i>F. dipsacea</i> (Rottb.) Clarke | – | April to June | |
| <i>F. hookeriana</i> Boeck. | – | March to May | |
| <i>F. miliacea</i> Vahl | Bara javani/ Joina | April to June | |
| <i>F. monostachya</i> Hassk. | Maramri | June to August | May be used as fodder. |
| <i>F. polytrichoides</i> (Retz.) R.Br. | – | April to June | |
| <i>F. quinqueangularis</i> Kunth | – | October to December | |
| <i>F. schoenoides</i> (Retz.) Vahl | Kesari malanga | July to November | |
| <i>F. squarrosa</i> Vahl | Jumka chaich | February to May | |
| <i>Fuirena ciliaria</i> (L.) Roxb. | – | November to January | |
| <i>Kyllinga monocephala</i> Rottb. | Gothoobi | April to June | Decoction of root used in fever and diabetes. |
| <i>Lipocarpus sphaelata</i> Kunth, | – | October to December | Root contains oil which relieves skin itching. |

Continued

| Botanical Name | Common Name | Flowering Period | Economic Importance |
|---------------------------------------------------------------------------|---------------------------|-----------------------|------------------------------------------------------------------|
| <i>L. squarrosus</i> (L.) Goetgh. | – | August to November | |
| <i>Pycnus capillaris</i> (Koen. ex Roxb.) Nees var. <i>stricta</i> Clarke | – | August to September | |
| <i>P. diaphanus</i> (Schrad. ex Roem. & Schult.) S. Hooper & T. Koyama | – | May to July | |
| <i>P. pumilus</i> (L.) Nees | – | October to January | |
| <i>P. stramineus</i> Clarke | – | September to November | |
| <i>Schoenoplectus juncooides</i> (Roxb.) Palla | Chesra | August to November | |
| <i>S. supinus</i> (L.) Palla | – | November to January | |
| <i>Scirpus articulatus</i> L. | Chichoora, Pappatichickha | October to December | Plant used as medicine for purgative. It is also used as fodder. |

The ethnobotanical and other uses of Cyperaceous weed are much diversified (Table 1) and also recorded in different old ethnobotanical references (PFRI, 1956). Therefore, the judicious and systematic cultivation procedures should be developed for high economic return from Cyperaceous weeds without hampering our agro-ecosystem and crop yield as well.

Dedication: This paper is dedicated to the memory of Late Prof. Dr. M. Arshad Ali, Department of Crop Botany, Bangladesh Agricultural University, Mymensingh, our mentor who have taught and expanded our horizons in the field of Plant Taxonomy, Biodiversity and Conservation.

References

- Anwer, S.K. 1971. The Sedges of East Pakistan Agricultural University Campus. M.Sc. thesis, Department of Crop Botany, Bangladesh Agricultural University, Mymensingh. p. 1–74.
- Ball, P.W., Reznicek, A.A. and Murray, D.F. 2002. Cyperaceae. *In: Flora of North America Editorial Committee (eds.), Flora of North America North of Mexico, Vol. 23: Magnoliophyta: Commelinidae (in part): Cyperaceae.* Oxford Univ. Press, New York. p. 3–608.
- Bryson, C.T. and Carter, R. 2008. The significance of Cyperaceae as weeds. *In: Bryson, C.T. and Carter, R. (eds.), Sedges: Uses, Diversity, and Systematics of the Cyperaceae.* Systematic Botany, p. 15–101.
- Chandler, J.M. and Cooke, F.T. 1992. Economics of cotton losses caused by weeds. *In: McWhorter, C.G. and Abernathy, J.R. (eds.), Weeds of Cotton: Characterization and Control.* The Cotton Foundation, Memphis, p. 85–116.
- Clarke, C.B. 1893. Cyperaceae. *In: Hooker, J.D., Flora of British India, vol.6, L. Reeve & Co. Ltd., Kent, England. p. 587–672.*
- Clarke, C.B. 1894. Cyperaceae. *In: Hooker, J.D., Flora of British India, vol.6, L. Reeve & Co. Ltd., Kent, England. p. 673–792.*
- Islam, M.Z. 2009. Study on the weed diversity in different field crops. M.S. thesis, Department of Agronomy, Bangladesh Agricultural University, Mymensingh. p. 69.
- Kern, J.H. 1974. Cyperaceae. *In: van Steenis, C.G.G.J. (ed.) Flora Malesiana, ser. 1. vol. 7, Noordhoff Int. Pub., Leiden. p. 499.*
- Mamun, A.A. 1989. Agro-ecological studies of weed in Bangladesh. Japan International Cooperation Agency, Dhaka. p. 1–142.
- PFRI. 1956. A note on the plants of medicinal value found in Pakistan. Medicinal Plants Br., Pakistan Forest Research Institute (PFRI), Abbottabad. p. 1–55.
- Prain, D. 1903. Bengal Plants. (Indian reprint 1981) Bishen Singh Mahendra Pal Singh, Dehra Dun, India. p. 1127–1161.
- Shear, G.M. 1985. Introduction and history of limited tillage. *In: Wiese, A.F. (ed.), Weed Control in Limited-tillage Systems.* Weed Science Society of America, Champaign, Illinois. p. 1–14.
- Uddin, S.N. 2007. Cyperaceae. *In: Siddiqui, K.U. et al. (eds.), Encyclopedia of Flora and Fauna of Bangladesh, Vol. 11, Angiosperms: Monocotyledons (Agavaceae-Najadaceae), Asiatic Society of Bangladesh, Dhaka. p. 165–289.*
- UNDP. 1988. Land Resource Appraisal of Bangladesh for Agricultural Development Report 2: Agroecological Regions of Bangladesh. UNDP (United Nations Development Programme) and FAO (Food and Agriculture Organization), Rome. p. 577.