



Role of juvenile traits for identification of some crop field dicotyledonous weeds in relation to their taxonomy and management

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Abstract

Seedling morphological traits of 74 dicotyledonous weeds of 64 genera under 30 families of angiosperms are studied in the crop fields of two subdivisions i.e. Barrackpur and Barasat in the district of North 24-Parganas of West Bengal. Conservative juvenile traits are considered for artificial key formation which is helpful for identification of weeds before flowering and fruiting. It is crucial for weed management program. All 74 seedling species are categorized into six seedling types based on nature, phyllotaxy and stipule of first two leaves. The families are arranged according to Takhtajan's system of classification (1997). This study also promotes importance of seedling features in determining inter-relationships among the taxa studied through PCA analysis. The seedling taxonomy is correlated with other botanical disciplines partly.

Keywords: Seedling morphology, artificial key, interdisciplinary approach, PCA analysis, Weed management.

Introduction

Weeds are one of the major significant threats to crop production with losses in crop yield and quality. Therefore, it brings a great economic impact for many farmers all over the world. Weeds compete with crops for nutrients, soil moisture, soil radiation and space; and reduce the yield and quality of produce¹. It is reported that weeds cause yields loss overall 34% in the major crop fields like rice, maize, potatoes, soybean and cotton². Most weeds germinate and established rapidly under favourable conditions. They also produce large no. of viable seeds even under environmental and soil conditions that are not favourable for the crop plants. Rapid and accurate weed identification at the seedling stage may be the first step towards a successful weed management program³ because most of the weeds are effectively controlled at a very young stage, so it is important to identify them as early as possible⁴.

Investigation of proper phenotypic traits of weed seedlings is the primary key for prominent weed identification leading towards suitable integrated weed management (IWM) program. In, Eastern India, it is the traditional method of farmers to kill mature existing weeds while already abundant mature viable seeds have been added to the soil⁵. These seeds may contain a hard seed coat and be resistant to different herbicides germinating in the next season. Therefore, before flowering and fruiting, the juvenile stage is the proper phase to prevent the manifestation of weeds. Hence, identification of weeds must be done at the seedling stage through appropriate keys constructed based on their constant conservative juvenile characters followed by some pioneer workers^{3,5,6}.

Survey of literatures reveals that there are some floristic works⁷⁻¹¹ on weeds in West Bengal as well as in the district North 24-Parganas. Even weed seedlings are studied by several workers^{5,13,15}. But there is no work on seedlings in the crop field weeds in the district of North 24 Parganas, although this district possesses 2,39,000 hectares of vegetable crop fields from which major portion of vegetable crops Kolkata - a metropolitan city, gets. The two sub-divisions, Barrackpur and Barasat which are nearer to Kolkata, supply a vast amount of vegetables every day to Kolkata. Considering the weed manifestation problem, a strategy for the identification of weeds at the seedling stage to enforce the weed management programme of the above two blocks has been considered.

Materials and methods

74 crop field weed seedlings (Table-1) have been collected from different crop fields of Barrackpur-II (GPS coordinates of 22°46'2.7372" N and 88°23'18.0384" E) and Barasat-I (GPS coordinates 22°43'34.1616" N and 88°28'29.8560" E) of North 24 Parganas (latitude 22°11'6" N to 23°15'2" N and longitude from 88°20' E to 89° E with an aerial extent of 4094 sq. km.) district in southern West Bengal, India, throughout the year of 2020. Soil type varies from alluvial to clay loam as it falls within the Gangetic delta.

Collections have been made through repeated field visits and field photographs have been taken for documentation. All recorded specimens were examined and identified using standard literatures¹⁴⁻²⁹. The mature seeds were also collected from the same crop fields and grown in the experimental garden of Bejoy Narayan Mahavidyalaya for identity confirmation.