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Study of phyto-sociology and ecology of naturally growing *Ocimum* species with their conservational strategies in Dakshin Dinajpur district of West Bengal

Tanmay Chowdhury [a,*], Amitava Mandal [b], Amit Kumar Jana [c], Subhas Chandra Roy [d], Dilip De Sarker [e]

[a] Department of Sericulture, Raiganj University, Raiganj, Uttar Dinajpur, West Bengal Pin 733134, India
[b] Department of Chemistry, Raiganj University, Raiganj, Uttar Dinajpur, West Bengal Pin 733134, India
[c] Department of Geography and Applied Geography, University of North Bengal, Raja Rammohunpur, Darjeeling, West Bengal Pin 734 013, India
[d] Plant Genetics and Molecular Breeding Laboratory, Department of Botany, University of North Bengal, Raja Rammohunpur, Darjeeling Pin 734013, India
[e] Department of Botany, Raiganj University College, Raiganj, Uttar Dinajpur, West Bengal Pin 733134, India

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ABSTRACT

A phyto-sociological and ecological study of naturally growing *Ocimum* species and their conservational strategies is carried out in Dakshin Dinajpur district, West Bengal, India. The main objective of this work is to find out their (*O. americanum* and *O.* × *africanum*) natural distribution, density, abundance and the dominance along with associated species. A total of 50 (1×1 m^2) quadrats were made at two study sites, each site contained 25 quadrats. Coexistence of almost 57 species of families with both study species of *Ocimum* in two study sites indicates similar habitat preference of these species. Dicotyledon species were found maximum in all quadrat of the two study sites. Following the present biotic or abiotic threat as well as oblivious human activities to these species we propose here few possibilities for their conservation. The study will encourage ecologists, pharmacologists as well as biologists to do similar studies on various naturally growing important plants in this part of country.

1. Introduction

Phyto-sociological study is the study of plant communities in relation to their compositional development and the relationship among inter species within similar ecological condition [1]. These studies give notable information about the distribution of species and affinities between species and/or group of species that result in a fruitful assessment of vegetation of the region under study [2]. One major importance of phyto-sociological study is to depict the population dynamics of a plant species occurring naturally in a particular community as well as to estimate their relation with other species [3]. Altitude, edaphic and climatic factors of any site are mostly responsible for distribution of a species, its diversity and natural abundance [4]. However, their population density is greatly affected due to several human activities [5]. Nevertheless, reasons like low population size, deforestation, habitat specificity, over grazing, unscientific harvesting, adverse change in climate, loss of habitat, urbanization and genetic drift have threatened the existence of a wide variety of medicinal and aromatic plants [6].

The genus *Ocimum* (Lamiaceae), commonly known as Tulsi, consisting of about 60–150 species, is mostly found in the tropical and subtropical Asia, Africa, Central and South America up to an altitude of about 1800 m from the mean sea level [7]. *Ocimum* species have been used for centuries far before the advent of modern medicine for its therapeutic potentials as stated in Ayurveda. The plant grows naturally in wide range of soils preferably moist soils at various climatic conditions nearly all over the world. The plant requires long days and relatively high temperature and humidity for first-rate growth.

In India, *O. americanum* L. and *O.* × *africanum* Lour. are generally distributed throughout the country from the plains to the lower hills [8]. Oils of both the species are extensively used in perfume, flavour, cosmetic and pharmaceutical industry [9]. Traditionally the plant is being widely used for the treatment of various ailments like dysentery, oral ulcer, headache, toothache, fever, cough, nasal bleeding and migraine [10]. The *Ocimum* species are also reported to possess antibacterial, antifungal, antioxidant and antidiabetic properties [11–14].

The district Dakshin Dinajpur of West Bengal, India is very rich in natural flora as well as medicinal and aromatic plants. In this district we found nine species/varieties of *Ocimum* growing mostly in their natural habitat or home gardens. Out of nine species/varieties two (*O. americanum* and *O.* × *africanum*) grow abundantly throughout the district. Although there are some previous reports on the floristic [15–16], ethnomedicinal [17–19] and phyto-association study of some plants [20] in the district, review of literature suggests that there is no detail work on phyto-association and ecology of *Ocimum* species. The present study was, therefore, undertaken to fill up the lacuna of the current knowledge to determine the influence of soil as well as agro-climatic conditions on species composition, abundance, frequency,

* Corresponding author.
E-mail address: tanmay000@gmail.com (T. Chowdhury).

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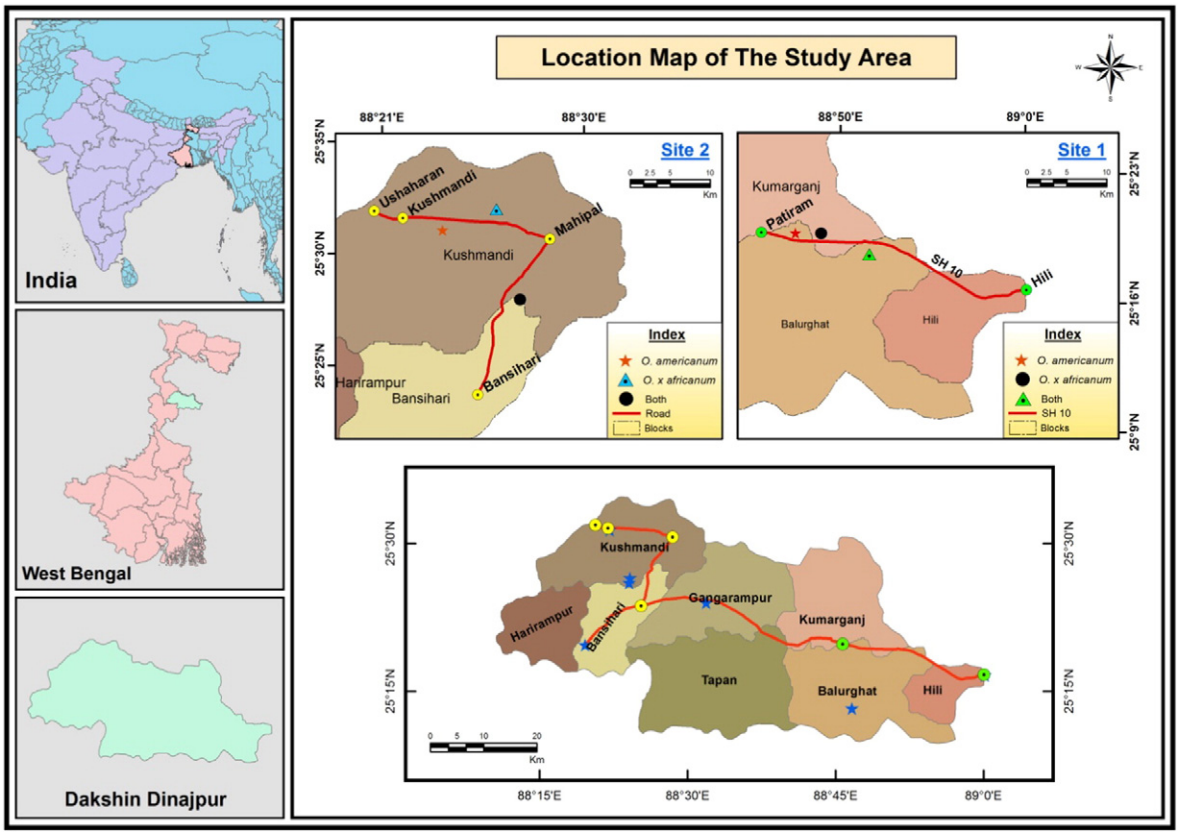

Fig. 1. District map of Dakshin Dinajpur and location of two study sites. (Site-1: Hili—Patiram state highway (SH 10); Site-2: Bangshihari—Ushaharan via Mahipal road).

density and communities of *Ocimum* species which are naturally distributed in Dakshin Dinajpur district. Thus, the knowledge gained from the present phyto-sociological and ecological study will contribute to the conservation and further cultivation of *Ocimum* species.

2. Materials and methods

2.1. Study area

The present investigation was carried out in the district Dakshin Dinajpur of West Bengal, India. It is a small agriculturally active district having eight blocks. Agriculture is the main activity and is practiced by the rural people. The district is situated between Bangladesh on the east and south, Uttar Dinajpur district on the North and West and some southern part lies adjacent to Malda district (Fig. 1). Geographically it lies between 25° 10′ N to 25° 40′ N latitude and 88° 10′ E–89° 00′ E longitude and covering an area of 2162 km^2. The study area is characterized by a high diversification of vegetation. It comprises of plane land and old alluvial soil. The study site has a plane topography and ranges in altitude from 25 to 40 m. The maximum and minimum temperature was 15.5–33 °C and relative humidity was 58–95% during the study time. In rainy season maximum rainfall received was 445.9 mm during June–September, 2013–2015 (Data collected from the Office of the Additional Director of Agriculture, North Bengal Regional Office, Jalpaiguri, Govt. of West Bengal, India) (Fig. 2). The major ethnic groups of the district are Santal, Munda, Oraon, Rajbanshi, Lodha, Sabar etc. who have an old tradition of using natural resources for their day to day life to cure different type of ailments.

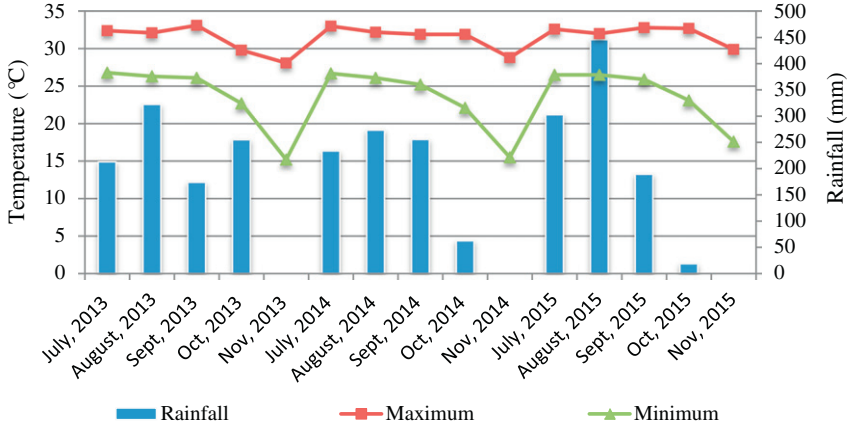

Fig. 2. Meteorological data of the study area, based on the temperature (min. and max.) and rainfall during study period.