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Identification of some Indian *Euphorbia* L. (Euphorbiaceae) at seedling stage and their numerical analysis in relation to taxonomy

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Abstract

Seedlings of fifteen species of the genus *Euohorbia* L. (Euphorbiaceae) from India have been studied for their morphological characterisation. Plants were collected from different regions of India. Conservative juvenile traits were considered for the construction of artificial key for their identification before flowering and fruiting. The stability of seedling traits is assessed after being analyzed them numerically using the principles of phenogram (UPGMA method) and PCA (Principal Component Analysis). Taxa on the clusters or clades are again correlated with some other available botanical disciplines like phytochemistry, anatomy, cytology, etc.

Key words: Seedling traits, Artificial key, PCA, UPGMA

INTRODUCTION

The genus *Euphorbia* L. s.l. (incl. *Chamaesyce* and *Poinsettia*) of Euphorbiaceae is the largest among angiosperms containing about 1900 (Mabberley 2008) or 2000 species globally (Frodin 2004; Horn *et al.* 2012). There are about 82 species of the genus known to occur in India (Lakshinarasimhan *et al.* 2019). The genus possesses great morphological diversity and diverse growth patterns along with its Cyathium (pseudanthial) inflorescence (Da Silva 2014). Seedlings of *Euphorbia* indicate some remarkable juvenile behaviour which is helpful for their identification in the early stage of life. Many workers, who worked on the importance of seedlings on taxonomy in different parts of the globe include Duke 1965, 1969; Ng 1975; Bokdam 1977; Naidu & Shah 1978; Sampathkumar 1982; Balasubramanyam & Swarupanandan 1986; Popma & Bongers 1988; Kamilya & Paria 1993a,b,1997; Paria & Kamilya 1999; Paria *et al.* 1990, 2006; Guillermo *et al.* 2001; Zanne *et al.* 2005; Rani & Datta 2020; Das & Kamilya 2020; Mahmood *et al.* 2021 and Gibreel *et al.* 2019. Based on these juvenile characters, the diversity of seedling morphology and their correlation can also be measured (Kamilya & Das 2014). Although correlation of characters may yield undesirable ambiguous result, but there are always some determinative relationships among the taxa (Sneath & Sokal1973). Both quantitative and qualitative data of seedling have immense value for numerical evaluation of taxa. Hence, numerical relationship among fifteen species of *Euphorbia* has been studied based on their seedling characters.

METHODOLOGY

For the present investigation, specimens were collected (Table -1) from their natural habitats in different parts of India, including Eastern Himalaya, during the years 2017 – 2019 (Figure 1). The seedlings were properly illustrated (Figure 2) and described. For proper identification, the natural seedlings were observed up to their adult stage. Specimens were documented in the form of mounted herbarium sheets and have deposited in the Herbarium of Bejoy Narayan Mahavidyalaya, Itachuna, Hooghly. For each species, 5 – 10 specimens from different habitats in their various growth stages were studied for validation. The morphological characters and terminology for seedling description, large array of literature have been consulted including