

# Identifying Superior Germplasm and Morphological Diversity of *Citrus Reticulata* Blanco for Breeding Purposes in Sikkim and Darjeeling Himalayas

Subhankar Gurung and Arun Chettri

<sup>1</sup>Research Scholar, Department of Botany, Sikkim University

<sup>2</sup>Assistant Professor, Department of Botany, Sikkim University

E-mail: subhankargurung@hotmail.com, achettri01@cus.ac.in

---

**Abstract**—*Citrus reticulata* is an important cash crop of Sikkim and Darjeeling Himalayas. However, the dwindling production in the recent years has been a major cause of concern. Furthermore, the lack of knowledge of its diversity has resulted in a lack of uniform fruit quality. Therefore, it has become imperative to identify superior varieties of mandarins in order to tackle this grave issue. Hence, a total of 105 accessions were collected randomly from different districts of Sikkim and Darjeeling region. Quantitative data were analyzed using one way ANOVA while both quantitative and qualitative data were subjected to cluster analysis. A significant variation was observed in the quantitative characters of floral, leaf and fruit traits except number of segments and leaf length/width ( $p < 0.0001$ ). The first 6 components of Principal component analysis (PCA) exhibited to 69.34% of the total variation. DIVA-GIS showed the highest diversity index for fruit weight, fruit diameter and TSS/Acidity in East district, Sikkim. The dendrogram generated divided the accessions into two major clusters which divided the accessions from Darjeeling with the remaining accessions. The sub-clusters so obtained exhibited clustering of the remaining accessions with each other irrespective of their geographical location. The average similarity coefficient (0.49) indicated wide variation in the morphological traits of the collected accessions. The study suggests that the mandarins grown in Sikkim and Darjeeling Himalayas are diverse and has high genetic potential which can be used to produce superior varieties.