

Kinley Dorji 2011: Identification of Mandarin (*Citrus reticulata* Blanco) in Bhutan by Using Morphological Characteristics and AFLP Analysis. Masters of Science (Tropical Agriculture), Major Field: Tropical Agriculture, Interdisciplinary Graduate Program.
Thesis Advisor: Mr. Chinawat Yapwattanaphun, Ph.D. 107 pages.

Citrus in Bhutan has not been identified and classified and often considered as a single variety. This has hindered the pace of development of citrus industry in Bhutan. To address this, a total of 69 accessions of mandarin (*Citrus reticulata* Blanco) from Bhutan were characterized by evaluation of morphological characteristics. Of these, 30 were unknown accessions from six major mandarin growing regions and 39 were from germplasm collection maintained at Renewable Natural Resources Research and Development Center (RNRRDC), Wengkhar, under Mongar district of Bhutan. One way ANOVA and Duncan Multiple Range Test were used separately for analysis of morphological characters. The statistical analysis of physicochemical parameters showed a highly significant difference among the groups of accessions for the characters of leaves and fruits ($p < 0.001$). Among the accessions from the field, accession from Dagana was observed with desired horticulture traits. The accessions from Shumar, Kengkhar and Sodrung were superior to accessions from germplasm accessions. Further, 23 out of 30 accessions from the field were analyzed, and verified for genetic variation and diversity through AFLP marker analysis. The five primers combinations discriminated 22 accessions. A total of 126 bands were polymorphic (51.64%) out of 244 total bands generated. E-ACA+M-CAG primer combination generated the highest number of total bands of which 38 percent were polymorphic. The UPGMA dendrogram obtained categorized 23 accessions to two broad groups containing 14 and 9 accessions respectively. The similarity coefficient among the accessions ranged from 0.48 to 0.91. Accessions *Samtse4* and *Dagana2* emerged very similar with similarity coefficient of 0.91. The accessions from Zhemgang formed a separate cluster. The AFLP analysis indicates that the mandarins in Bhutan are uniquely diverse as against the assumption of single variety.

Student's signature

Thesis Advisor's signature