ABSTRACT

Background: Subgenus *Leptostemonum* (Leptostemonum clade) is the most species-rich within genus *Solanum* with about 550 species. The species of the genus are economically important, with 39 % of the indigenious vegetables grown and consumed in Uganda. In the plant breeding industry, wild crop relatives from the subgenus have the potential for improving crop resistance against diseases, drought and pests. But, the taxonomy of the subgenus still presents challenges and identification is often problematic. This study therefore, aimed at streamlining the taxonomy of the subgenus and updated the diversity and distribution in Uganda.

Methods: Field surveys to collect data and specimens from the four floral regions of Uganda (U1, U2, U3 and U4) were purposively done basing on distribution data in the FTEA and voucher specimens housed at MHU. The known distribution data guided the identification of new collection localities for the *Solanum* species in Uganda. At each sampling site, plant collections were made using simple random sampling procedures, where five mature specimens were collected. In addition, the sampling points were geocoded using a hand-held GPS. From each plant collected, a young leaf was cut using a sanitized pair of secatuers and immediately put to dry in silica jel in a labelled ziplock bag for later use in DNA extraction. The collected plants were pressed, dried and identified at MHU. Additional herbarium specimens were retrieved from GBIF and MHU. Thus a total of 186 specimens were analysed for distribution. Distribution maps were generated using *ArcMap* software and modelling was performed using MaxEnt software version 3.3.3. DNA extraction was done using EZNA sp. Plant mini Kit (Omega Bio-Tex, Inc), DNA amplification was done for two gene regions, *TrnL-TrnF* and *Waxy*. Sequence editing was done using Geneious Prime Version 2022.1. Bayesian and Maximum likelihood were performed using Mrbayes and IQ tree. Morphologocal studies using phenetic methods was done for *S. campylacanthum* and *S. cerasiferum*. Dendrograms and box plots were generated using PAST.

Results: This study reports 18 species of the *Leptostemonum* clade including; *S. aculeastrum*, *S. acculeatissimum*, *S. aethiopicum*, S. *anguivi*, *S. campylacanthum*, *S. cerasiferum*, *S. chrysotrichum*, *S. coagulans*, *S. cyaneopurpureum*, *S. dasyphylum*, *S. forskalii*, *S. giganteum*, *S. hastifolium*, *S. lanzae*, *S. macrocarpon*, S. *melongena*, *S. tettense* and *S. wrightii*). The most species

rich regions are south western Uganda and Karamoja region. *Solanum chrysotrichum* was reported for the first time and *S. forskali* is confirmed to occur in Uganda. The species of the subgenus commonly inhabit disturbed habitats especially croplands, forests and grasslands. Temperature and rainfall are the most important climatic variables that define the distribution of most of species of *Solanum*. Morphological studies of *S. campylacanthum* and *S. cerasiferum* revealed that the species are distinct. Three clusters have been obtained within the group of *S. campylacanthum*. 1. unarmed *S. campylacanthum,* 2. Sparsely armed *S. campylacanthum,* 3. moderately to densely armed *S. campylacanthum* and one group of *S. cerasiferum.* The phylogenies of *TrnL-TrnF* and Waxy showed strong support for the monophyly of the *Leptostemonum* clade (PP=1) for both Bayesian and maximum likehood analyses. The Ugandan species align within the known clades that include; Eggplant, Aculeastrum, Coagulans, Giganteum and also the Anguivi grade.

Conclusion: Prickle density and leaf tip angles are for the first time reported as useful morphological characters in the intraspecific delimitation of *S. campylacanthum* and may be adopted at broad-scale studies to unravel the morphological intraspecific complexities of *S. campylacanthum*.The Leptostemonum clade is monophyletic with an inclusion of the Ugandan specimens.