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Short Communication

DIVERSITY OF MORPHOLOGICAL CHARACTERISTICS OF *ZIZIPHUS MAURITIANA* LAM. INDIAN JUJUBE AND *ZIZIPHUS JUJUBA* MILL. CHINESE JUJUBE IN SRI LANKA

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INTRODUCTION

Ber or jujube ('Masan' or 'Debara' in Sinhala) is a tropical fruit species belongs to the family Rhamnaceae. Among many species identified of *Ziziphus*, *Z. mauritiana* Lam. and *Z. jujuba* Mill. are clearly identified as the two economically important cultivated species based on their distinct differences in morphological characteristics (Azam *et al.*, 2006; CABI, 2013; ICUC, 2002; Liu *et al.*, 2009). There are two major domesticated jujubes, *Z. mauritiana* or Indian jujube and *Z. jujuba* or Chinese jujube which are available in Sri Lanka (Dasanayaka *et al.*, 1996). *Z. mauritiana* is an economically important tropical fruit tree, which is grown all over the drier parts of the Indian subcontinent, Africa and northern Australia. It is particularly an important tree to grow in dry regions, because it can withstand long periods of drought. It is a small thorny and bushy fruit crop. Ber is Native to South and Central Asia and China and naturalized in a large number of tropical countries (Parrek, 2001; Azam *et al.*, 2006; Preeti *et al.*, 2014). Ber is particularly popular for its delicious fresh fruits and also important as a multipurpose tree (Azam *et al.*, 2006). *Z. jujuba* is more popular for its delicious and nutritious fruits, wide adaptation, easy management and other multiple uses.

Ber is a completely neglected and underutilized fruit in Sri Lanka until recent past. Presently, it has become a demanding fruit crop after introduction of several improved exotic varieties to the country with superior fruit qualities by private nurseries and popular as "Thai Apple". This demand for ber created a

requirement of information on suitable varieties, propagation techniques and agronomic practices etc. to grow it under local conditions. Therefore, studies were conducted through exploration, collection, characterization and evaluation of available ber germplasm in the country. The main objective of this research was to evaluate the morphological characters of tree and fruits to assess the diversity of ber in the country and select suitable promising accessions to identify standard varieties adaptable for local conditions.

MATERIALS AND METHODS

The study was carried out through literature survey, exploration, collection, characterization and evaluation of naturally existing and cultivated ber plants in the various parts of the country. Data on traditional knowledge and tree history were collected through a questionnaire. The plant samples of branches, leaves, flowers and fruits of selected germplasm were characterized for morphology using descriptors of IPGRI for tropical fruits and Bioversity International. Fruit characteristics were studied with the randomly selected 10 fruits for each accession. Fruit samples were further evaluated for nutritional qualities. Propagating materials *i.e.,* scion wood, seeds, stem and root cuttings were also collected and planting material production was carried out for conservation of the distinct accessions and for further research and development activities.

RESULTS AND DISCUSSION

There were ten accessions with distinct characters collected from the Dry zone areas of Aralaganwila, Dambulla, Hambantota, Maha Iluppallama, Putlam and Kurunegala and the Wet zone areas of Matale. Two species were identified as, *Z. mauritiana* and *Z. jujuba* by evaluating morphological characters. The accessions collected from the Dry zone areas of Dambulla, Hambantota and Putlam were found naturally grown and showed prominent characteristics of *Z. mauritiana* (Table 1). These were thorny shrubs of about 2-5 m height with dense canopy, heavy bearing and fruits were comparatively smaller (1.54-7.16 g) drupes with a fleshy pulp and a single hard stone. Mostly, fruits were round to heart in shape. These accessions did not show accepted fruit

Table 1: Fruits quality characteristics of ber germplasm collected at FCRDS, Gannoruwa.

Accessions	Brix Value	Moisture (%)	PH	Acidity (%)	Taste
Batalegoda	8.0	86.5	4.90	0.10	Moderately Sweet and less acidic.
Walewela	21.0	83.0	5.20	0.60	Moderately Sweet. Less acidic After taste slightly. astringent
Aralaganwila	11.5	85.6	5.08	0.30	Moderately Sweet. Less acidic After taste slightly astringent
Kandalama	10.0	88.8	5.51	0.12	Moderately Sweet. Less acidic After taste slightly astringent
Kumbiyangoda	13.2	84.9	2.99	1.28	No Sweetness Highly acidic astringentstarchy mouth feel
Kurunegala	16.0	81.2	4.90	1.10	Sour, starchy
Dambulla	16.0	78.3	3.40	1.17	Moderately Sweet. Less acidic After taste slightly astringent
Hambantota	8.6	77.4	2.60	0.21	Less Sweet. Less acidic After taste slightly astringent
Putlam	1.6	78.2	2.83	0.90	Highly acidic Less Sweet starchy, mucilaginousastringent
MI	12.0	84.0	4.50	0.12	Moderately Sweet. Less acidic After taste slightly astringent

or tree characteristics for cultivation. However, the accessions of 'Kurunegala' and 'Kumbiyangoda' with having characteristics of *Z. mauritiana* showed more acceptable characteristics such as less thorny, moderately dense canopy and better fruit qualities in fruit size (7.68-11.56 g) and flesh. The immature fruits were green in colour and changed yellow to orange in ripening. These fruits were attracted specially by children for its sour and sweet taste.

Four exotic Chinese jujube accessions were found from Aralaganwila, Batalegoda, Kandalama and Walewela. These were promising with tree and fruit characteristics compared to *Z. mauritiana* accessions (Table 1). These accessions possessed larger fruit size (10.38-85.83 g), fruit colour of green changed to yellowish green at maturity and acceptable pleasant taste with crunchy texture. The trees were mostly bush type and tree height was about 4-6 m, very less thorny, less dense and spreading canopy and vigorous in vegetative growth.

These accessions were successfully grafted to the *Z. mauritiana* seedlings and showed the possibility of growing under local conditions.

CONCLUSIONS

There were two species of ber in Sri Lanka, *Ziziphus mauritiana,* Indian jujube and *Ziziphus jujuba*, Chinese jujube. The evaluated accessions showed variation in characteristics in fruits and tree morphology. The naturally grown *Z. mauritiana* accessions were not commercially important due to the thorny tree nature and small fruit sizes with less attractive fruit qualities. Chinese jujube accessions had desired characteristics that could be selected as a homegarden crop or for commercial cultivation.

REFERENCES

Azam, S., Alli, E. Bonkungon, C. Bowe, C. Dekoch, A. Godara and J.T.Williams. 2006. Ber and other jujubes and *Ziziphus* species. Fruits for the future 2, Revised edition. Ber, International Centre for Underutilized Crops, University of Southamton, UK.

CABI. 2013. *Ziziphus mauritiana.* Invasive Species Compendium. www.cabi.org

Dasanayaka, M.D. and W. D. Clayton. 1996. Revised hand book to the Flora of Ceylon Vol. X. Oxford & IBH publishing Co. Pvt. Ltd., New Delhi, India.

ICUC 2002. Ber (*Ziziphus mauritiana* Lam.). Field manual for extension workers, International Centre for Underutilised Crops, Southampton, UK.

Liu, M.J. and Z.H. Zhao. 2009. International survey and discussion on the names of genus jujube and its main species. I International Jujube Symposium. ISHS Acta Horticulture 840 (9): 81-88

Pareek, O.P. 2001. Ber. Fruits for the Future 2. Eds. A. Hughes, N. Haq, R. W. Smith. pp 13-43. International Centre for Underutilised Crops, University of Southampton, UK.

Preeti and Shalini Tripathi. 2014. *Ziziphus jujuba*: A phytopharmacological review. International Journal of Research and Development in Pharmacy and Life Sciences. 3 (3): 959-966.