

CHARACTERIZATION AND PHYTOCHEMICAL EVALUATION OF
SELECTED UNDERUTILIZED FRUIT PLANTS AND ESTABLISHMENT OF
SUITABLE PROPAGATION SYSTEMS

Submitted by

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ABSTRACT

Syzygium caryophyllatum (S:Dan), *Microcos paniculata* (S:Kohukirilla), *Antidesma ghaesembilla* (S:Bu embilla), *Antidesma alexiteria* (S:Karawala kebella), *Baccaurea motleyana* (S:Gaduguda), *Cynometra cauliflora* (S:Namnam), *Phoenix pusilla* (E:Ceylon date palm), *Psidium guineense* (S:Ambul Pera), *Ziziphus oenoplia* (S:Hin Eraminiya) and *Elaeocarpus angustifolius* (S:Nil veralu) are 10 fruit species found in Sri Lanka which are considered as underutilized. Lack of information on nutritional properties of the fruits, and scarcity of the fruits in the market could be the reasons for the underutilization of these fruit species. Revealing the phytochemicals, antioxidant properties and nutrients of these fruits will be beneficial for better utilization and commercialization of these fruits in future. Furthermore, establishment of propagation systems suitable for mass propagation is important to bring these underutilized fruit species back into cultivation. The 10 fruit plants were selected based on a discussion held with agriculture officers in Veyangoda, Gampaha. They were first authenticated using both morphological characters and nrITS, *trnH-psbA* and *matK* regions since accurate authentication of species is essential for reporting new substances or even known substances of the species. The presence of phytochemicals; polyphenols, flavonoids, tannins and saponins in methanol, water and acetone extracts of the fruits was tested qualitatively. Then the total polyphenol and flavonoid contents were estimated using Folin-Ciocalteu and Aluminium chloride methods, respectively. Antioxidant activity of the fruit extracts was measured using Trolox Equivalent Antioxidant Capacity (TEAC) by DPPH assay, ABTS assay and FRAP assay. The vitamin C, fat, protein, carbohydrate, moisture and ash contents of the fruits were also analysed. The total phenolic contents, flavonoid contents and antioxidant activities of the fruit extracts were different depending upon the type of the solvent used for

extraction. The most efficient solvent for the extraction of total phenolics, flavonoids and antioxidants from the selected fruits was 60% acetone. The highest total phenolic content, flavonoid content and ascorbic acid content were recorded from *P. pumila* and *S. caryophyllatum*. Propagation of the fruit plants was studied by means of stem cuttings and seeds. Hardwood, semi-hardwood and softwood cuttings were planted in three soil media commonly used by farmers; topsoil + sand (1:1), topsoil + sand + compost (1:1:1) and topsoil + sand + coir dust (1:1:1) and treated with the plant growth hormone auxin. Only two fruit plant species could be successfully propagated by stem cuttings. *Topsoil: sand (1:1)* is the most suitable medium for softwoods of *A. alexiteria* that can be propagated without adding auxin. Semi-hardwood cuttings are the best cutting type and *topsoil: sand (1:1) with auxin is the best potting medium for S. caryophyllatum*. Seeds of *S. caryophyllatum*, *A. alexiteria*, *B. motleyana*, *C. cauliflora* and *P. pumila* could be successfully germinated under *in vitro* and *in vivo* conditions. This research provides a better understanding of 10 underutilized fruit species with promising characters growing in the Gampaha district, which increases awareness to enhance their commercial value and promote their utilization with better biodiversity conservation strategies. Promoting farming of these underexploited fruit crops in home gardens will remove them from the critically endangered state and increase the income of farmers.

Keywords: Phytochemicals, Proximate analysis, Seed propagation, Underutilized fruit plants, Vegetative propagation