

IDENTIFICATION OF MORPHOLOGICAL AND CHEMICAL VARIATION OF ANNONA'S IN SRI LANKA.

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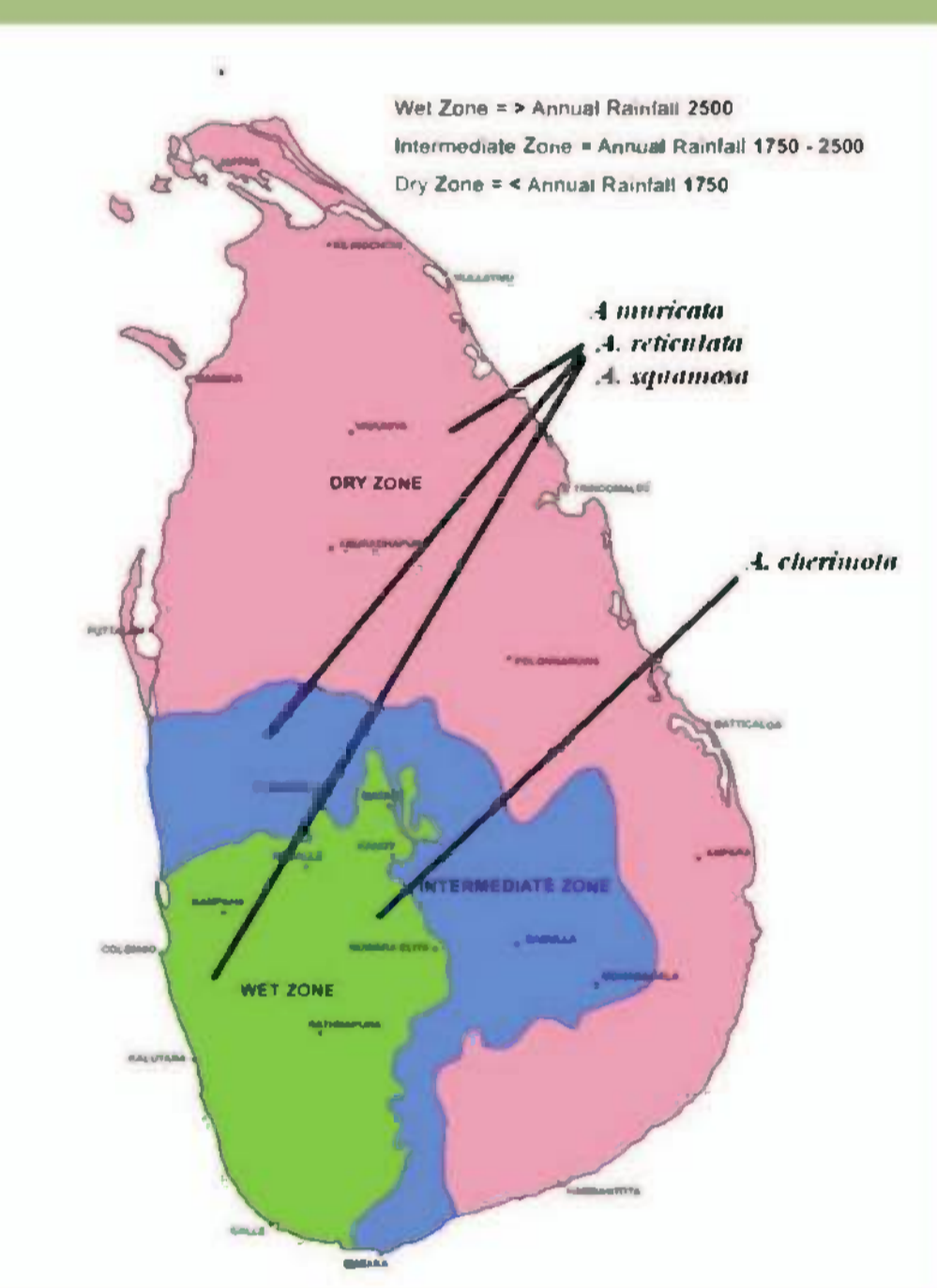
INTRODUCTION

In Sri Lanka, 45 species have been identified as members of the family Annonaceae. Of which Annona fruits are consumed widely as fresh fruits and the trees are also a source of medicinal and industrial products. In addition to vitamins and minerals, Annon fruits also contain numerous bioactive chemical substances such as acetogenins, alkaloids terpenes, flavonoids and oils. Due to the presence of such substances, these fruits have been considered as healthy fruits and commonly used in indigenous medicines. species observed in Sri Lanka are: *A. muricata* (soursop), *A. reticulata* (custard apple), *A. squamosa* (sugar apple), *A. cherimola* (cherimoya) and *A. glabra* (pond apple).

Most of Annonas are multipurpose deciduous underutilized fruit trees. The fruits vary from species with differences in shape size and colour. The flowers are pollinated by insects, although fruit production is usually poor. An average fruit yield is 50-100 kg/tree whereas the commercial life of a tree is about 15 years. The trees are easy to cultivate, require comparatively little care and do not suffer from serious pests and diseases. Normally Annona plants can be observed in home gardens distributed throughout the country. Despite their importance as a multipurpose fruit trees and use in indigenous medicines, little is known on morphological and chemical variation of Annona species in Sri Lanka. Hence, objectives of this ongoing study are to identify morphological variation of plant, leaf, flower and fruit characters and chemical variation of fruits. Further, the study expects to develop a sampling frame for studying morphological variation of Annonas in Sri Lanka.

MATERIALS AND METHODS

While considering agro-ecological zones, the multistage sampling method has been selected to collect the data on plants and leaves and also collect fruit samples for analysis. In the first stage agro-ecological zones were considered whereas in the second stage administration districts have been selected. In the third stage divisional secretariat divisions were considered, which followed by considering the fourth stage (village officer divisions). Finally, at the fifth level, individual home gardens are being considered for sample collection. The descriptor list for cherimoya developed by International Plant Genetic Resources Institute (IPGRI) was used as guidelines to consider 45 characters. Sample collection were done from 3 districts so far. Data on 45 characters were analyzed. Chemical characterization will be conducted once morphological variation studies are being completed. Then, plus trees will be identified and chemical parameters of fruit pulp such as moisture content, carbohydrates, sugars, proteins, lipids, fiber, total acidity, ash, calcium, phosphorous, ferrous, vitamin A, B, and C, acetogenins, alkaloids and flavonoids. AOAC (Association of Official Analytical Chemists by AOAC International, Maryland,) methods will be used to analyze the chemical parameters.



RESULTS

Distribution of Annona species in Sri Lanka

Distribution of *Annona* species in Sri Lanka changes from species to species according to the agro climatic zones. *A. muricata*, *A. squamosa* and *A. reticulata* were distributed in throughout the country representing the dry, wet and intermediate zones of Sri Lanka except certain parts of hilly areas. *A. chermola* was strictly available only in highlands of the country whereas *A. squamosa* was mostly available in the dry and intermediate zones of the country. *A. glabra* was distributed mainly in marshy lands of the country (Map 1).

Map 1: Distribution of Annona species in Sri Lanka based on agroecological regions.

Morphology of Annona Species

So far *A. muricata* and *A. squamosa* fruits were collected from 82 home gardens, representing 6 DS divisions and 3 districts.

Soursop (*A. muricata*) was a small-medium size low branching tree growing to 4-9 m (Plate 1) which was the most common Annona species in Sri Lanka. The fruit was broadly cordate, unsymmetrical as shown in Plate 2. Variation observed on morphological characters of Annona species are given in Table 1. In soursop, fruits bearing was through out the year with two major flowering seasons as May to July and November to January.

Table 1: Variation of morphological characters of Annona species.

Characters	<i>A. muricata</i>	<i>A. squamosa</i>
Trunk colour	light grey to dark grey	light grey to dark grey
Trunk ramification	one branch to three or more branches	three or more branches
Suckering tendency: number of suckers	absent,	suckers present
Colour of young branches	light green	light green
Leaf blade shape	ovate to obovate	ovate to lanceolate
Leaf length [mm]	99-156	80 - 140
Leaf width [mm]	34.4-62	30 - 56
Petiole length [mm]	4-6	4 -10
Colour of mature leaves	dark green	green
Colour of young leaves	light green	light green
Leaf margin	entire	entire
Leaf blade venation	intermediate	submerged
Petal outer colour	cream to green	cream to green
Petal length [mm]	20-50	18-22
Petal width [mm]	20-40	6-8
Location of fructification	base of the crown, middle of the crown, top of the crown	middle of the crown, top of the crown
Fruit shape	broadly cordate	cordate
Fruit length [mm]	120-240	50-85
Fruit diameter [mm]	70-145	45-70
Weight of ripe fruit [g]	250-750	120-230
Uniformity in fruit size	highly variant	highly variant
Fruit symmetry	highly variant	highly variant
Peduncle length [mm]	25-130	25-60
Exocarp colour	light green to yellowish green	green to purple
Weight of all fresh seeds per fruit [g]	6 to 18	6 to 15
Number of seeds	18-42	18-30
Pulp fibre content	high	low to high
Pulp taste	sour to sweet	sweet to high sugar
Pulp oxidation	oxidized to very oxidized	oxidized to very oxidized
Weight of fresh seed [g]	0.4-0.5	0.4 - 0.45
Seed coat colour	dark brown to black	dark brown to black
Seed length [mm]	4 - 16	13 - 16
Seed length [mm]	7-8	7-8



Plate 1: *A. muricata* tree at home garden



Plate 2: Variation of *A. muricata* fruits



Plate 3a:

Skin colour variation of *A. squamosa* fruit (green and purple)



Plate 3b:

Sugar Apple (*A. squamosa*) was small shrub growing up to 6 m. Plants had open crown with irregular branches. The fruit exocarp colour of sugar apple were highly variable changing from green to purple as shown in Plates 3a and 3b. Observed morphological variations of *A. squamosa* are also shown in Table 1. Fruits bearing habit of what was also seasonal, with major flowering season of May to July.

There were no significant variations observed in following 13 characters: Pubescence of young branches, Shape of leaf base, Shape of leaf apex, Pubescence of leaf, Colour of the internal petal base, Petal pubescence, Sepal pubescence, Exocarp type, Resistance to abrasion, Pulp colour, Pulp texture, Tenacity of the seed in its epithelium. Therefore those information were not included in Table 1

CONCLUSIONS

Morphological variations were identified in mostly in leaves and fruits of *A. muricata* and *A. squamosa*. High quality plants can be selected develop good mother plant stocks for high yield, vigorous plants. Annona plants can be cultivated easily in every parts of the country; therefore it has great potential to produce as agro forestry crop. Research studies are continuing for the Annona species and for chemical analysis.