Studies on Bali Salak Cultivars

(*Salacca zalacca* var*. amboinensis*)

(Arecaceae)

Thesis submitted by
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ABSTRACT

Bali salak cultivars (*Salacca zalacca* var*. amboinensis*) (Arecaceae) commonly grow in Bali and other areas of the Indonesian archipelago and are of considerable value as a trade commodity because of their edible fruits. The thirteen cultivars that are currently recognised in Bali are distinguished from each other on the basis of fruit colour and taste. The research reported in this thesis documents the variability in Bali salak cultivars and provides a method for their reliable identification prior to fruiting. This involved analysis of vegetative anatomical and morphological characters as well as reproductive characters of all 13 cultivars.

Analysis of variance (ANOVA) was used to analyse the quantitative features to determine which characters differed significantly between cultivars. Multivariate techniques of cluster analysis and multidimensional scaling (MDS) were used to delimit and test groups of cultivars. Means for 17 of the 42 quantitative characters differed significantly ($p \leq 0.05$) and nine of the qualitative characters showed distinct variation between the cultivars. Cluster analysis of quantitative and qualitative characters established that the 13 cultivars grouped into four distinct clusters. MDS indicated that plant height, leaf length, middle leaflet length, female flower length, adaxial cell length, periclinal cell wall pattern, flesh taste, presence of fruits and seeds, which had square correlation values of more than 0.7, are reliable discriminators of cultivars. This study showed that anatomical and morphological characters and reproductive characters can be used as diagnostic tools to identify the 13 Bali salak cultivars. However, based on the multivariate analysis, it is proposed that this 13 be reduced to eight. The eight cultivars recognised in this study are Muani, Bingin, Putih, Nyuh, Maong, Boni, Gula and Biasa. Keys and descriptions of each cultivar are provided and recommendations are made for future research in *Salacca zalacca* var*. amboinensis*.

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GLOSSERY OF TERMS

abaxial – the side of an organ that faces away from the axis that bears it, for example, the under surface of the leaf.

adaxial – the side of an organ that faces toward the axis that bears it, for example, the upper side of the leaf.

amphistomatic – stomata on both upper and lower epidermis**.**

anisocytic – stomata surrounded by three unequally sized cells.

anomocytic – the cells surrounding each stomata are not recognizably different from the remaining epidermal cells.

aperture – a specialized region of a pollen grain wall, that is thinner than the remainder of the wall and generally differs in ornamentation and/or in structure.

cyclocytic – stomata have a ring of subsidiary cells of more or less equal size.

diacytic – stomata surrounded by two subsidiary cells.

disulcate – referring to pollen structure with two furrow like apertura.

echinate – referring to exine structure which bears spinelike sculpturing elements.

helicocytic – stomata are surrounded by a helix of four or more cells.

hypostomatic – stomata only on the lower epidermis**.**

inaperturate – referring to pollen structure without aperture.

meridionosulcate – a pollen grain with an encircling sulcus.

monosulcate – referring to pollen structure with one furrow like aperture.

paracytic – one or two subsidiary cells enclosing the guard cell length at right angles to the longitudinal axis of the guard cells.

plicate leaves – a situation in which the leaflets remain fused, as seen in seedling leaves.

polyembryony – referring to the development of more than one embryo from a single egg or ovule.

reticulate – referring to exine structure which consists of a network enclosing small, often in irregular spaces.

scabrate/granulate – a general term for sculpturing elements of exine which is less than 1 µm diameter and varying in shape.

sporoderm – the entire wall of a pollen grain or spore.

staurocytic – stomata surrounded by three subsidiary cells.

subsidiary cell – epidermal cells surrounding the guard cells.

tetracytic – stomata surrounded by four subsidiary cells.

vivipary – a situation that occurs when the embryo breaks through the seed coat (and defies natural growth inhibitors) to begin growing, sometimes while the fruit is still attached to the parent plant.