

A CRITICAL STUDY OF SOME QUANTITATIVE CHARACTERS  
OF BANANA.

by

G.V.Wickramasekera, Dip: Agric: (Bomb.).

INTRODUCTION

The once profitable banana plantations in Jamaica and Central and South American Atlantic sea-board from Mexico to Colombia have, during the past decade, been proving unprofitable and in consequence have led to the abandonment of extensive areas, owing to the incidence of Panama Disease caused by Fusarium Cubense, particularly, on those plantations which have been opened indiscriminately without due regard to their suitability to Gros Michel, the principal variety grown for export. This variety owes its popularity to its ability to stand up well to conditions of bulk transport viz: a thick skin not over sensitive to bruises, a strong central fruit stalk with strong pedicles of 'fingers', close fitting and compactness of bunch, large bunches of moderately large 'fingers', good flavour, and an attractive appearance on ripening: But as Wardlaw and Mc Guire (1) have pointed out the degree of susceptibility of this variety to Panama Disease is enhanced by a state of low fertility induced by cultivation under unfavourable conditions and/or on impoverished soils. As it was of great economic importance, the Empire Marketing Board provided the necessary funds and investigations were set on foot by the staffs of the Royal Botanic Gardens, Kew, and that of the Imperial College of Tropical Agriculture, Trinidad, B.W.I., to secure and study as representative a collection as possible of the wild and cultivated members of the genus Musa, with a view to replacing the Gros Michel with another variety or to breed a banana having the same desirable commercial characters and

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at the same time immune to Panama Disease. At the Imperial College of Tropical Agriculture a start was made by getting in a collection of the 'varieties' of Musa grown in the Western Tropics, and from time to time specimens from other parts of the Tropics, after a period of quarantine at Kew, are being received and are added to the collection. The necessity for this precaution is primarily against introducing Bunchy Top disease proved by Magee (2) in Australia, and Hutson and Park (3) in Ceylon to be caused by a virus transmitted by the banana aphid, Pentalonia nigronervosa, and also against the possibility of introducing any pests or diseases which may find conditions in the new environment congenial to their rapid development and spread. At the present time (May 1931) the collection consists of 22 seeded types and 80 cultivated specimens. A wide survey of the material in hand showed that probably several specimens were known by a single name and a single specimen by several names. A preliminary necessity is that the material in hand and fresh material on receipt, after careful study, should be accurately grouped and classified. When one considers the formidable and conflicting list of banana 'varieties', the urgent necessity for a proper grouping and classification of the varieties of banana extant is quite apparent. Cheesman (4) states, 'As far varietal names, applied to clones usually included under M.sapientum or M.paradisiaca, an attempt to compile lists resulted in over seven hundred entries in a few weeks, and it then became doubtful whether a list three times that length would be anywhere near complete or whether it would serve any useful purpose.' The varieties of edible banana being parthenocarpic and sterile are normally propagated vegetatively. As is the case with most species of plants propagated vegetatively, the banana, in particu-

lar, responds to changes in environment to a marked degree. The wide fluctuations noticeable in some of the characters normally used for distinguishing varieties, when grown even under moderately different conditions, make the study of diagnostic characters difficult. In an attempt to group and classify the material available, at the Imperial College of Tropical Agriculture, considerable time and energy were spent in recording all the characters of each of the clones, in the hope that precise diagnostic characters could be recorded. It was hoped that it would be possible to pick out certain characters which appeared in a series of 'varieties' considered at present to be related to one another. Further, it was hoped that some quantitative and, particularly, some qualitative characters could be noted which would enable one to identify two 'varieties' which appear to be similar viz: Giant Fig and Gros Michel or Bolinaga 4 and Congo. For instance the first two named 'varieties' are closely related to each other morphologically; although differences in their genetic composition are seen by the physiological difference shown in degree of disease resistance and ripening. Soon it became apparent that some of the characters already recorded in other parts of the world, on similar or identical material, did not correspond to those recorded on the material in hand, and moreover, that in the same locality or even in the same field, variations due to difference in environment were noticeable. In some instances the fine degree in variability made the description of certain characters very difficult. Previous workers having, in most cases, expressed the results of investigations in quantitative rather than in qualitative terms, it was suggested that a preliminary critical study of some of the quantitative characters be made in order to ascertain the validity, if any, of using these characters for diagnostic purposes. This aspect of taxonomic studies was

was enquired into at a later date. The present paper is a record of these studies. The first part deals with a brief review of the literature on banana varieties and an examination of Teodoro's (5) and of Quisumbing's (6) descriptions of some banana varieties in the Philippines; **the** second part is a statistical examination of certain quantitative characters of banana, on material then available at the Imperial College of Tropical Agriculture, in order to describe such characters in an adequate manner and to ascertain the validity, if any, of using them in taxonomic studies.