ENVIRONMENTAL ADAPTATION OF TROPICAL PASTURE PLANTS

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Preface

This book has been written for students who have completed an elementary course in pasture science, and for pasture workers who have an interest in plant adaptation.

A few books have been published which catalogue the morphological features, adaptive characters and agronomic utility of the individual grass and legume species grown in tropical pastures. This book has a different objective. It does not attempt an encyclopaedic coverage of plant characteristics, but seeks to establish the principles of ecological success for pasture plants used in the diverse environmental conditions of tropical farming systems.

The introductory chapters discuss the patterns of geographical distribution of tropical pasture grasses and legumes, the origins of the domesticated plants, and their capacity for genetic variation. The persistence of plant yield depends upon plant replacement through the cycle of flowering, seed formation, accretion to soil seed reserves and seedling regeneration, or upon perennation; factors influencing these pathways are described.

The main themes of the book are concerned with the dependence of ecological success upon plant resistance to environmental stress, and/or upon the superior capacity of plants to gain a greater share of environmental resources for growth through interference with their neighbours. There is considerable variation available among cultivated tropical pasture plants in the mechanisms of avoidance or tolerance of environmental stresses. These stresses include those associated with climate (drought, chilling, frost), with edaphic and physiographic situation (flooding, impeded drainage, soil acidity, mineral toxicities, salinity and soil texture), and biotic hazards (grazing and cutting, burning, pests and diseases). The dominance of plants in mixed pastures is discussed in terms of genetic variation in growth responses and in the capacity for interference with the availability of light, moisture and nutrients to companion plants, or for interference through allelopathy. These principles are illustrated by reference to concrete findings from pasture research carried out in northern Australia and in other tropical and sub-tropical countries.

The scientific advances of the past 20 years in the field of tropical pasture science have opened new possibilities for animal production and for the stabilising of ecosystems. The development of seed and planting material of improved pasture varieties which are well adapted to specific environmental

niches is the single innovation most easily absorbed into tropical livestock farming systems and most required for gains in productivity.

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