INTRODUCTION

THE VIABILITY OF GRASS SEED UNDER WET TROPICAL CONDITIONS

The whole question of the viability of grass, vegetable, tree and other commercially important seeds in the wet tropics has been under investigation for many years, at first sporadically as the need arose, but during recent years intensively, especially in certain centres such as Trinidad, Hawaii, South Africa, etcetera. In the Imperial College of Tropical Agriculture several post-graduate theses of recent years have included work on grass seed viability. (Tuley, 1954, Evans 1954 and Davies 1955).

Much of the earlier work and hence references refer to experiments with temperate grasses and American and Australian experiments deal with both temperate and tropical species. It is necessary to refer to this basic work as it often has considerable application to our specific problems. An important source of information in this category is "Twenty years of Seed Research" by Barton and Crocker.

In all the centres where research on seed viability in the wet tropics has been undertaken there is an ill-defined dry season, in Trinidad of 4-5 months duration, during which grasses set most or all of their seed and in the middle of which, generally, seed viability of samples is highest. (Dadey 1955).

However, seed is rarely used for propagation in the wet tropics and although this may be a reflection on the ubiquitous system of using soilage grasses for fodder which are planted from sets, rather than leys or pastures planted from seed, it is more likely to be because few grasses do in fact set apparently viable seed in the wet tropics. If they do it is often impossible to harvest them satisfactorily in the field, and to store them without rapid deterioration. The regular supply of cheap, dependable seed of various major economic grasses, especially of low-growing, grazing types might well revolutionize farming practice in the tropics, often a most important policy in view of present world trends. It is therefore of the utmost importance to tackle this problem objectively and systematically so that by presenting the difficulties and possibilities in a clear light practical solutions may be found.

The first limitations on flowering and seed production may well be said to be nutrition and environment. These are the concern of the agronomist and the farmer. The next limiting factor however, is genetics. In many grasses the genetical make up is such that no seed or seed which is sterile, is set due to homozygosity in a self-sterile community, e.g. Echinochloa pyramidalis in Trinidad (Davies 1955), or certain types of polyploidy, e.g. aneuploidy. This side of the problem is dealt with in detail in Section III of this thesis.

In many plants and especially in hybridisation the physiology of reproduction and embryo development is a limiting factor in seed production. It is known, for instance, that the length of the pollen tube is genetically defined in a species. In the case of hybridization the length of the style in the female parent may be longer than the maximum length of the pollen tube of the male and so fertilisation will not be effected. In cross fertilised species pollinating agents may be absent. The occurence of genetical incompatibility between strains or ecotypes often leads to the formation of empty or aborted seed. This is, strictly, a genetical problem. There are many physiological processes in the formation of a viable seed from an unfertilised ovule which can be upset thus resulting in nonviable seed. This is a field which has hardly been touched in grasses and might prove rewarding in later studies.

If the grass manages to set viable seed the next problem is to harvest it. Natural hazards such as weather and pests are too well appreciated to need mentioning here. Certain standard behaviour such as premature shedding of seed needs special attention. It has been found in Trinidad with Bothriochloa pertusa, and Setaria sphacelata that cutting and sheaving the culms and allowing them to mature in the stook gives a far greater yield of mature seed and results in very little premature shedding in the case of B. pertusa

S. sphacelata ripens unevenly so that this method allows all seed to come to maturity (Davies 1955).