MEETING AT THE STANDARDS BRANCH, DEPARTMENT OF PRIMARY INDUSTRIES, BRISBANE, SEPTEMBER 16, 1977
CONTROLLING AND IMPROVING SEED QUALITY

An afternoon visit to the Department of Primary Industries Standards Branch was held on Friday, 16th September. The Director of the Branch, Mr. W. V. Mungomery, welcomed members and guests and briefly outlined the overall function of Standards Branch. The major part of the afternoon was spent on a guided tour where members had an opportunity to see the procedures involved in seed testing and to hear about research on seed quality. At the end of the visit Dr. P. C. Whiteman thanked the staff of Standards Branch for a most interesting and enjoyable visit.

The afternoon's proceedings have been summarized in the following two papers. The first by Mr. R. L. Harty outlines the current role of Standards Branch in certification and seed quality control and foreshadows likely changes. The second paper, by Mr. J. R. Butler, summarises the research being undertaken on seed quality.

THE ROLE OF THE QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES IN SEED QUALITY CONTROL

R. L. HARTY

Seed quality is a loose concept made up of a number of different attributes. For the purpose of discussing the role of the Department of Primary Industries in seed quality control we will focus attention on genetic purity and those characteristics which combine to form the pure-live-seed factor. These are the pure seed percentage by weight and the germination percentage by count of seedlings in a germination test.

Producers of all types of goods must supply levels of quality consistent with the needs of purchasers. High seed quality helps minimise sowing hazards and therefore one of the objectives of seed production should be to guarantee the planting value of the product. As with most other goods, quality is not automatically associated with production and it must therefore be ensured by control measures.

Seeds differ from other kinds of agricultural produce in that they are produced by the farming system for use within the same system. One could look upon seed as being produced by the system to support its own continuation and therefore the onus of responsibility for quality control could rightly be placed entirely upon the private sector of primary industry.

However, Government has traditionally been seen to have responsibility in this area, partly to assign by statute certain liabilities which cannot be assigned by common law, and also because the seed industry lacks cohesion in an organisational sense and has little coercive power over its loosely composed membership. Legislation provides an arbitrary means of coping initially with seed quality factors in commercial transactions but ideally addresses itself also to the ultimate question of planting value.

In Queensland, the Department of Primary Industries is vested with authority for quality control of what are officially defined "agricultural requirements", including seeds, fertilizers, stock foods, pesticides and veterinary medicines. The relevant legislation which is administered by the Standards Branch is the Agricultural Standards Act 1952-1972 and under this Act, separate Regulations are framed for each type of agricultural requirement.

Genetic purity of seeds can be ensured by means of statutory seed certification schemes. These provide, essentially, a means of production control and thereby enable the buyer to place his trust in the labelled product description. With certified

seed the buyer can be sure of obtaining seed of varieties or cultivars which are true to type within practical limits.

On the other hand, when dealing with the pure live seed factor the principle of minimum standards is invoked. This relates to specific technical requirements for pure seed content and germination percentage. Although arbitrary, these standards are, as much as possible, derived by the consensus of producers, processors and consumers. It is for conformity with these and other standards that seed is tested and in Queensland the Standards Branch operates testing laboratories for this purpose in Brisbane and Toowoomba.

Seed certification

The Department of Primary Industries has exercised authority over seed quality for a long time. In certain areas of control, notably those dealing with noxious weeds, there will no doubt always be a need for legislative authority. But in other areas there has been a tendency to withdraw where it has been recognised that industry is capable of accepting greater responsibility for maintaining its own quality control programs.

Perhaps the best example of this occurred a few years ago when the Department of Primary Industries cancelled the scheme for seed certification in hybrid sorghum. In the 1930's, when hybrid cropping was first introduced in Queensland, the seed certification scheme played a vital role in ensuring that correct steps were taken in the production of hybrid seed. During the last decade, however, the energy and initiative of seed producers increased to such an extent that the industry became quite capable of creating good sorghum hybrids and producing the seed successfully.

The point should be made, however, that maintenance of genetic purity in hybrids is simplified by the fact that each batch of seed is a single "one-off" run. Provided that parental lines are properly maintained and crossing-plot techniques adequate there is normally little likelihood that hybrids will not be true to type. The same cannot be said for open or self pollinated crops where genetic purity can decline over a number of generations from field contamination and other causes.

Apart from hybrid maize and sorghum, agricultural crops have not been certified in Queensland. This is not to say that they have no need for such control measures, and procedures other than those of seed certification are often used for this purpose. These are either of a semi-compulsory type as with the wheat and barley pure seed schemes, or voluntary, as for soybeans.

The need for ensuring pure seed supplies is catered for in most other advanced countries by certification and in the United States there has been a further development in which government involvement in such schemes has been markedly reduced through the formation of Crop Improvement Associations, which perform the certification functions.

Although agricultural seed in Australia can be provided without much crop seed certification, the same cannot be said for pasture species. The importance of seed certification is demonstrated by the great emphasis given to certifying pasture seeds in the temperate regions of Australia. In Queensland the need for simple but effective certification schemes has in recent years been amply suggested by a number of examples of confused identity in some of our major grass species. This is being partly overcome by means of a modified version of certification which will ensure some availability of authentic varieties with the minimum of bureaucratic control. There is one area where an argument exists for continuing activity by government in quality control work.

Seed standards

Little has been said so far about the main activity in regulatory control of seed quality—the operation of seed standards for physical purity and germination. Here we can look forward to some changes in the near future. Throughout Australia it has been realised that we must move away from minimum standards as the sole determin-

ant of seed quality. Although no legislative changes have yet been made, all States have agreed on a policy whereby responsibility for quality control will be shared by seed buyers and sellers. Quality standards will probably remain but seed being offered for sale which does not meet the standards would be labelled with information taken from a seed test.

It is also expected that standards may be raised eventually to levels more consistent with modern farming practice. Optimal plant populations are becoming more critical with the increasing use of precision seed sowing equipment. Sellers will be obliged to comply with statutory labelling requirements and the maxim *caveat emptor* (let the buyer beware) will be invoked so that buyers may negotiate for the level of seed quality most suitable to their needs. It is necessary to stress that they will be assisted with accurate test information on the seed label.

In conclusion, a trend towards a decreased direct role in seed quality control by government can clearly be seen in Queensland. In one particular area, seed certification of pasture species, there may be a need for greater input but in most other areas of seed quality control the more likely future procedures are those which will involve greater participation by the private sector.

RESEARCH ON SEED QUALITY

J. R. BUTLER

The seed research section concerns itself with many problems involving seeds, ranging from investigations of seed quality losses and possible vigour tests within the bean seed industry through to descriptions of germination conditions and longevity of *Parthenium* and water lettuce seed.

With the area of research on pasture species, our program is concentrating on three aspects—

(i) the role and value of hard seeds of leguminous species in pasture establishment,
(ii) the production and maintenance of high quality grass seed, and
(iii) improved testing conditions for pasture species research into dormancy and hardseededness.

Value of hard seeds

Testing of legume seed has been plagued with the problem of what value to accord the hard seed fraction when assessing the quality of any seed lot. This is particularly important when there are legislated quality standards.

Temperature appears to be the major field factor that will cause hard seed to become permeable. A range of tropical leguminous species has been screened for retention of hardseededness in response to temperature. Siratro hard seed is particularly sensitive to temperatures above 40°C, losing 40% to 60% of its hardseededness after a few hours at 45°C. In a co-operative trial with Agriculture Branch, hard seed (unscarified, manually scarified, or dry heat treated) was sown at four sites in Queensland. At all sites, manually scarified seed gave the best germination and there was very little evidence of late germination of the unscarified seed.

Production of high quality grass seed

In a co-operative project with Dr. J. Hopkinson, samples of grass seed (green panic, Gatton panic, Makueni guinea, *Brachiaria decumbens*, *Setaria anceps*, and *Paspalum plicatulum*) are being tested at frequent intervals over a period of three years. These samples have been obtained with different post-harvest practices e.g. slow dried, rapid dried, "sweated" shaken, and "sweated" threshed.

This project has clearly demonstrated that immediate post-harvest management can have a substantial influence on the longevity of the seed. Furthermore, numerous

instances have been recorded in which the germination level has increased very largely even after the passage of only one month.

Accelerated aging techniques have been used to predict those samples that have the highest storage potential. To date, these techniques have proved quite promising for evaluating samples with respect to storage potential. This line of work will attract more interest in the future, particularly in view of the poor history of grass seed storage under tropical and sub tropical conditions.

Improved testing conditions

Since seed testing commenced in the temperate regions, the testing conditions required by temperate species have been well documented. This can not be said for tropical species. Research into suitable methods for testing tropical species is well under way but is hampered by the tendency for the optimum conditions to be dictated by the age of the seed. Freshly harvested seed quite often has different temperature requirements than does mature seed. This has meant that such research must be conducted from immediate post-harvest through until the seed becomes "mature". Research at the moment is concentrating on *Brachiaria decumbens* and *Cenchrus ciliaris*. In the past, investigations have been conducted on green panic and *Urochloa mosambicensis*.

Efforts have been made to find efficient methods to reduce the level of hard seed when testing legume seed. Dry heat treatments have received a good deal of attention and it is interesting to note that the temperature of the cooling phase can markedly influence the effectiveness of the dry heat treatment. For example, there are many fewer hard seed in dry heat treated Townsville stylo seed cooled at 0°C than if cooled at 5°C.

FIELD MEETING AT TURKEY STATION, MIRIAM VALE, NOVEMBER 11, 1977

PASTURE IMPROVEMENT IN CENTRAL COASTAL SPEARGRASS COUNTRY

A field day, jointly sponsored by the Tropical Grasslands Society and the Miriam Vale Rural Science Society, was held at Turkey Station near Miriam Vale on November 11, 1977. The field day theme, 'Pasture improvement in central coastal speargrass country', was chosen both to recognise the efforts of local graziers and also as a tribute to Mr N. H. Shaw, C.S.I.R.O., who is retiring in June, 1978, after a long and distinguished career in pasture research, much of it at Rodd's Bay. The field day was opened by Mr D. Murray, Chairman of the Miriam Vale Rural Science Society.

PASTURE RESEARCH AT RODD'S BAY

N. H. SHAW*

The experimental site at Rodd's Bay is on undulating ridgy country which originally carried a mixture of narrow-leaf ironbark, bloodwood and Moreton Bay ash. The soils are derived from granite and are predominantly solodic and lacking in nitrogen, phosphorus, sulphur, molybdenum and potash. The country is generally fairly similar to large areas between Gladstone and Bundaberg. Average annual rainfall is 900 mm but over the period since research started in 1945, the annual total has ranged between 400 and 2100 mm, including three major droughts. Rainfall in

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