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Fig. 1.—Harvesting operations in progress at Bridgetown



PRODUCING GOOD QUALITY SUBTERRANEAN CLOVER SEED

By B. J. QUINLIVAN, B.A., B.Sc. (Agric.), Adviser, Seed Certification and Weeds Branch

HARVESTING of subterranean clover seed for sale has been carried out for many years now, and unless the unexpected happens it will continue to be a valuable secondary crop for farmers in the medium and higher rainfall districts. There have always been a number of problems associated with the production of good quality seed, but as harvesting and grading techniques have improved many of these have disappeared. There are a few which still remain.

Not all seed of course is certified, but the minimum standards required for certified seed can be taken as a basis of good quality. Certified seed must meet the following requirements:—

- (1) At least 95 per cent. true to type as regards strain.
- (2) Free from all serious weed seeds.
- (3) A pure seed content of at least 98 per cent.
- (4) A minimum germination of 80 per cent.

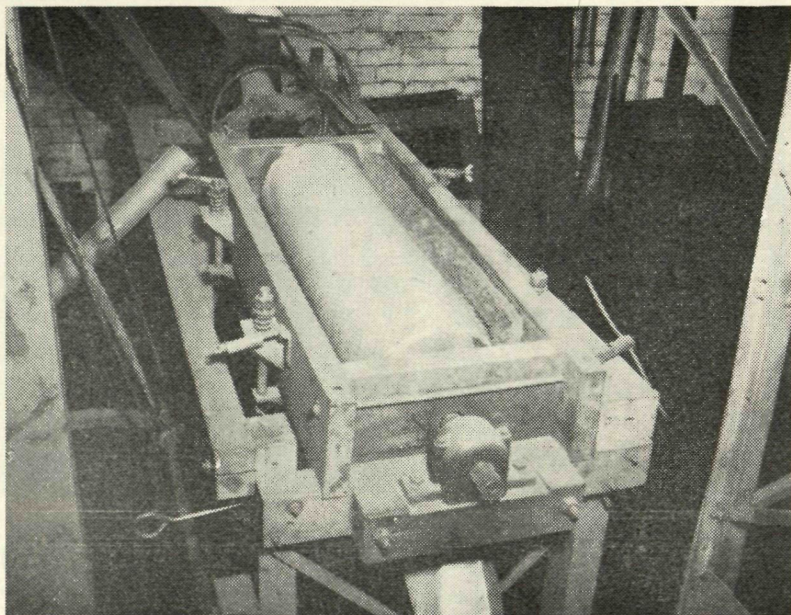
With the modern grading machinery at our disposal there are no longer any technical problems associated with the production of seed with a satisfactory purity and free from weed seeds, but there are still difficulties in the way of producing seed with a satisfactory germination. Over the last few years it has not been uncommon for up to 10 per cent. of all seed submitted for certification to be rejected

because the germination was below the minimum requirement. With over 100 tons of seed involved, this rejection caused a considerable financial loss. Some of this seed eventually was passed after further treatment, but in many instances there was no possible way of bringing the seed up to standard.

When a germination test is undertaken in a laboratory the seeds or seedlings present at the conclusion of the test are classified as germinated seedlings, hard seeds, dead seeds, or broken seedlings. A low germination figure therefore results when a high proportion of the seeds or seedlings falls into the latter three categories.

In some instances the producer has little or no control over the factors which cause an excessive proportion of dead or broken seedlings, but in other instances a slight adjustment in technique could make all the difference.

Fig. 2—A decoating machine with the top removed showing wire mesh roller and fibre mat



HARD SEEDS

A hard seed is one which is impermeable to water and is not capable of immediate germination. It may remain ungerminated for many years.

All legumes have hard seeds, and under pasture conditions this is a desirable asset, in that it ensures survival of the species from year to year irrespective of seasonal variabilities. However, in the year of establishment of a new pasture a high hard seed content is not desirable. Subterranean clover has a natural hard seed content which varies between 60 per cent. and 80 per cent. The extent to which this hard seed is converted into seed capable of immediate germination depends entirely on the efficiency of the "decoating" or scarification technique.

The types of decoater in use at present are many and varied, but unfortunately not all of them are efficient. Some of the machines recently installed in grading sheds decoat the seed effectively but the scarification is not sufficient to convert the hard seeds into germinating seeds.

One of the most satisfactory machines is the older type, which consists of a wire mesh roller revolving at a speed of approximately 400 r.p.m. within a concave lined with a fibre mat. A clearance of approximately one inch is left between the roller and the fibre mat. This type of machine will produce a high germinating

sample provided the seed is not forced through too quickly. An output of eight to ten bags an hour is all that it can effectively handle. The comparatively slow output is one of the reasons why this type of machine has been discarded by some seed-grading firms and replaced with machines capable of higher outputs.

If these newer machines cannot be modified to improve their scarification it will be necessary for seed-grading operators to give serious thought to the reintroduction of the older, more satisfactory types.

DEAD SEEDS

Legume crops or pastures as a group normally have a very low dead seed content and in this respect they differ from some of our native flora—the seed of which, under optimum conditions, will give only a very low germination. If the dead seed content of any line of subterranean clover seed is in excess of 10 per cent. or 15 per cent., it is obvious that something went astray prior to, or during, harvesting operations.

Dead seeds can be caused by a number of factors, but by far the most important is fire damage. Of the strains which are at present harvested in quantity, only Dwalganup is immune to damage by fire, the reason being of course that it buries its burrs below the ground surface. Very little, if any, preharvest burning is carried out

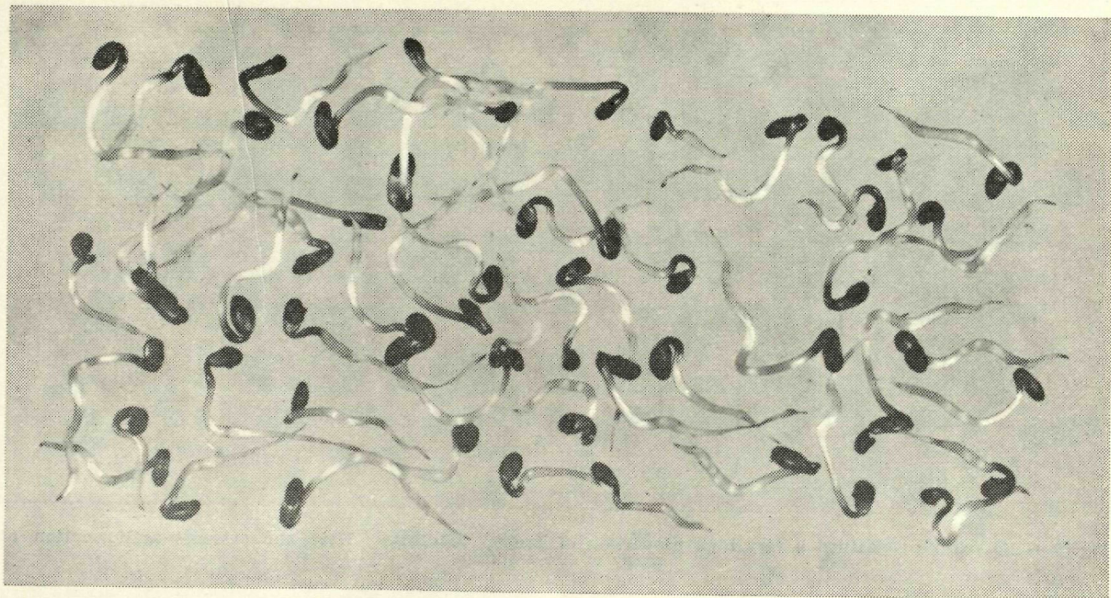


Fig. 3—A seed sample with good germination

now with the later-maturing strains such as Mt. Barker or Tallarook but burning is still a common preharvest practice with the Yarloop strain.

The Yarloop strain is an intermediate type, in that it sometimes buries its burr and at other times does not. The final position of the burr depends largely on the height of the top growth, the soil type

and the age of the pasture. Burning the top growth prior to harvesting speeds up the actual harvesting operations considerably, and in these days of relatively low prices is frequently an essential technique if seed is to be produced cheaply.

There are no definite rules which can be specified as to how a paddock should be burnt without damaging the seed. The

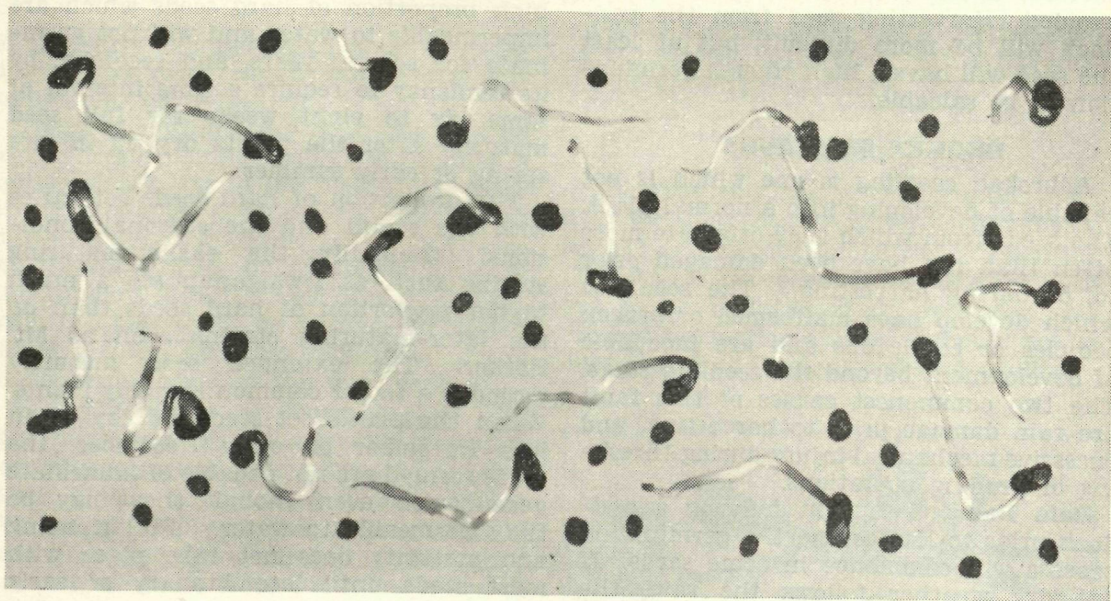


Fig. 4—This sample was not scarified sufficiently and carried a high proportion of hard seeds

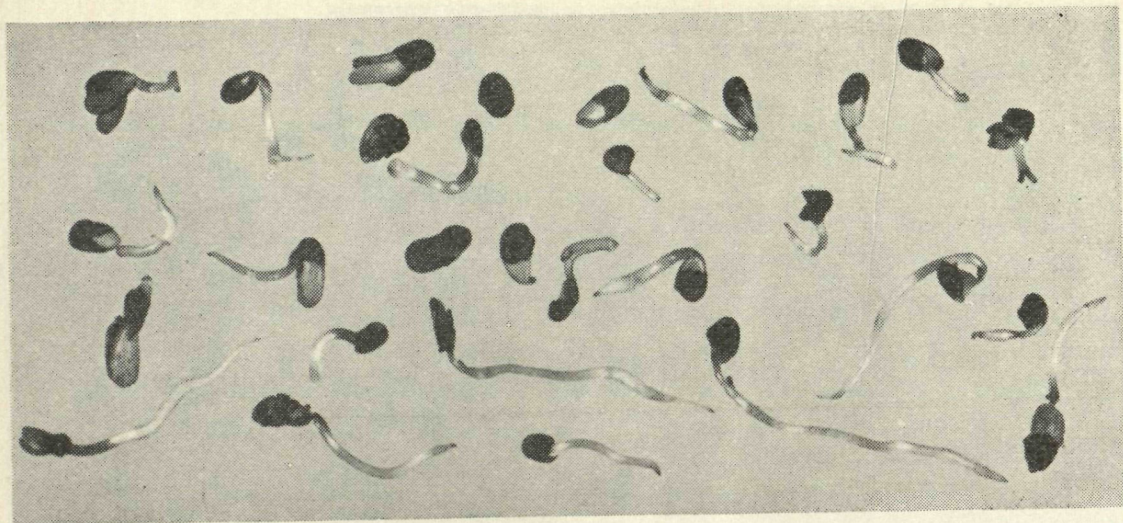


Fig. 5—This sample contained a very high proportion of broken seedlings. Note the extreme malformation of many of the seedlings

only points that can be made if burning is contemplated are, that the producer should examine carefully the amount of top growth and the position in which the burr has been set. The amount of top growth is a very important factor; if it is excessive, as much as possible should be removed before burning by stocking the paddock, or by some other means. If a high proportion of the burr has been set above ground or on the soil surface, burning the paddock should be avoided. Harvesting seed from the paddock will be more difficult, but at least the seed will have a high enough germination to be saleable.

BROKEN SEEDLINGS

A broken seedling is one which is not capable of developing into a normal plant. The seeds from which they originate more often than not have been damaged prior to, or during harvesting. The seedlings which develop have malformed or broken radicles or cotyledons and are incapable of development beyond the seedling stage. The two commonest causes of this fault are rain damage prior to harvesting, and excessive mechanical injury during threshing or grading operations.

Rain Damage—If rain falls on a paddock prior to harvesting, the germination process will commence in some seeds. If hot dry weather follows the rain, the germination process will cease and the

seed will dry off. The majority of these seeds are incapable of normal development later in the year—at the best they can produce only a broken malformed seedling. The extent of the damage in any particular paddock depends on the quantity and duration of the rain, the actual date on which it falls, and the strain of sub-clover being grown.

Subterranean clover has a natural ability to survive unseasonal rains. It does this in two ways, firstly, by producing a high proportion of hard seeds which are impermeable to water and will not germinate for several years, and secondly, by its tendency to require a time interval of some six to eight weeks for full seed maturity after the plants dry off in late spring or early summer.

The proportion of hard seeds set varies with the strain and the seasonal conditions. Generally the earlier-maturing strains such as Dwalganup set a much higher proportion of hard seeds than do the later-maturing strains such as Mt. Barker. The extended seed maturity period is a factor common in many plants. When the plants set seed and dry off in late November or early December, the seeds formed are not capable of immediate germination even though they may be fully permeable to water. Full ripening and maturity does not take place with most seeds until late January or early February, and as such, unseasonal rains

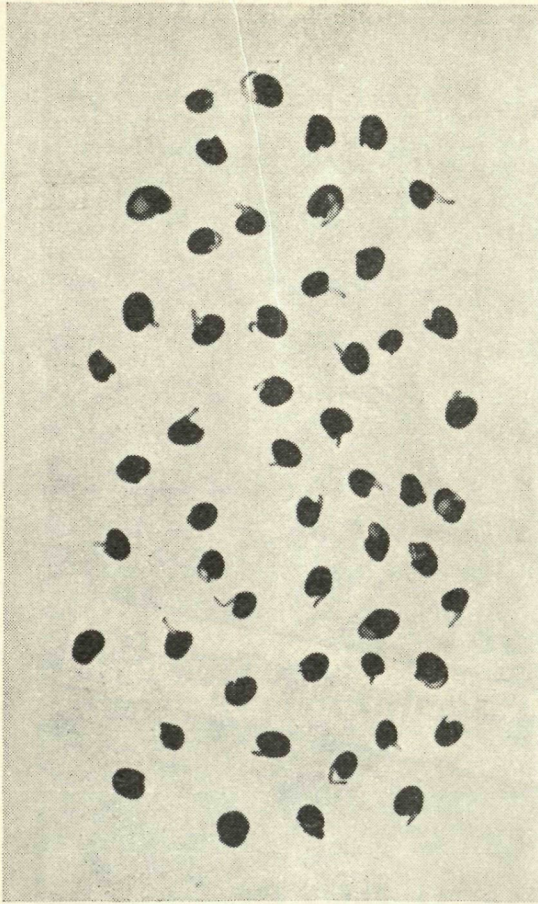


Fig. 6—Rain damaged seed. The damage is not so obvious after the seed has been graded as the decoating process removes most of the protruding radicles

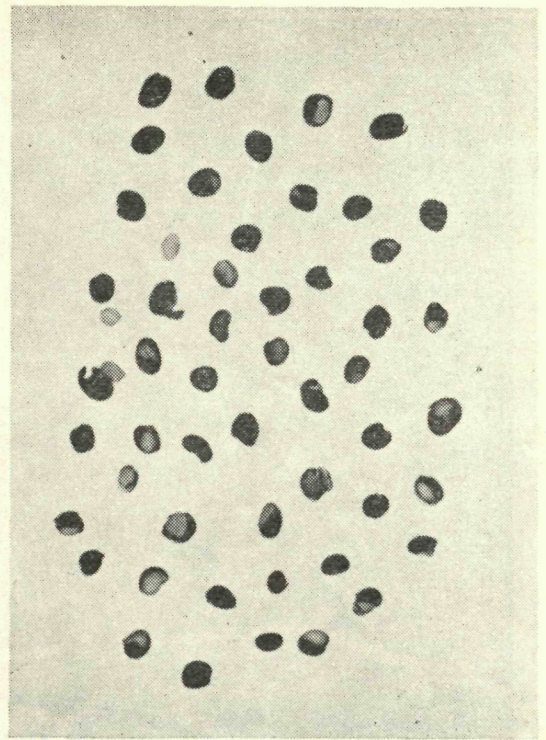


Fig. 7—Badly chipped and skinned seed. The result of faulty threshing or grading

in the early summer will not do as much damage as rains which fall in the late summer or early autumn.

There is nothing any producer can do to avoid rain damage, but if harvesting is contemplated late in the season and there are reasonable grounds for suspecting rain damage, it would be advisable to collect a sample of the burr from the paddock and forward it to the seed testing laboratory. A test could be carried out which would give an accurate indication of the likely germination of the final product.

Faulty Grading or Threshing—If the threshing or scarification machinery is not correctly adjusted, it is quite common for much of the graded seed to be partially skinned or chipped. This damage to the seed coat and the embryo or endosperm not only detracts from the appearance of

the graded seed but may also cause a considerable drop in germination. Many of the seedlings produced have badly damaged cotyledons or radicles and can only be classed as broken seedlings.

Faults such as these are easily rectified by the correct adjustment of the harvesting or grading machinery.

GENERAL

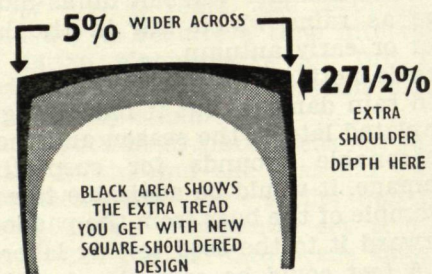
The relatively low prices on offer these days for subterranean clover seed makes a high level of production efficiency essential. However, if our present markets for seed are to be maintained or expanded, increased production efficiency should not be achieved at the expense of seed quality.





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