

degrees C. and a night temperature of 18 degrees C. Seeds like browntop require a higher light intensity, a longer period for full germination, and a temperature up to 30 degrees C. The seeds are germinated on filter paper squares.

On the purity and germination certificate such terms as interim counts, hard seeds, and abnormal growths are found which are in general use for all germination work.

The interim germination count is the total number of seedlings which germinate at an early stage of the test. This interim or first count indicates speed of germination and is a better guide to the value of the seed than the final germination figure, as it gives an indication of the vigour of the line. A low interim count followed by a high final count is often an indication that the germination of a line is beginning to fall because of age.

Hard seeds occur in clovers and allied legumes. A hard seed is a seed with an outer coat which is impervious to water and will not germinate until this is broken down by some natural or mechanical means. In one Departmental trial it was found that practically all the seeds in a sample rubbed out by hand were hard, but during mechanical threshing abrasion of the seed coats occurred and then most of the seed germinated. Machine dressing will further reduce the proportion of hard seeds and increase the germination of the line. When hard seeds are sown most of them will germinate after a time, as the seed coats become permeable to water through the action of soil water, abrasion, and temperature changes. Experimentally it has been shown that in the soil within a reasonable time about half of the hard seeds of red clover will germinate, all hard seeds in lucerne should germinate, and about one-third of the hard seeds in all other clovers, including white clover, alsike, and subterranean clover, should germinate.

Abnormal growths arise from seeds which germinate in the laboratory, but lack the power to survive in the soil. Many abnormal growths are seedlings with glassy or broken roots. Many lack the root hairs which are so essential to the uptake of plant foods from the soil. A higher incidence of abnormal growth is found in lines which have been harvested out of condition. Trials have shown that the setting of the header harvester is an important factor affecting the percentage of abnormal seeds in red clover, but is of less importance with white clover. This is probably because white clover is usually in better condition when threshed. Damage also occurs in the field before harvesting, probably as a result of insect attack. Machine dressing does not increase the number of abnormal seeds to any extent in red clover.

Dormancy in seeds is a general term applied to any condition which prevents living seeds from germinating when the ordinary requirements of moisture and temperature have been met. Particularly with header harvested seeds, freshly harvested seed though quite dry is not fully matured and as a result a proportion will not germinate. These seeds will mature during storage and as a result a higher germination test may be obtained on the line some little time



Counts being carried out in the germination laboratory. It is essential to know the exact germination when buying or sowing seed.

after harvesting. With pasture seeds and most cereals the percentage of dormant seeds is not often high and the condition does not persist long enough to slow up germination in the field; by the time the seed is to be sown it is fully mature and will give its maximum germination under optimum conditions. The best known exception is Algerian oats, the seed of which will not give a satisfactory field establishment in the first autumn after harvest. When a freshly harvested line of seed germinates poorly it is important to know whether dormancy or some other factor is the cause. When dormancy is suspected in seed tested for germination shortly after harvest the seed is subjected to further tests. Sometimes a chemical tetrazolium test is used. Should the tetrazolium test and the normal germination test not correspond dormancy is indicated, and suitable measures are taken to rectify it. Dormancy can generally be broken by pre-chilling the seed in a wet condition in a refrigerator for a short period, though sometimes, as with browntop or paspalum, soaking in a chemical solution such as dilute potassium nitrate may be necessary.

After such treatment maximum germination is obtained under normal laboratory conditions.

Strain Testing

Many people find it hard to believe that just as there are different strains of animals within a breed, so too there are different strains within a grass or clover crop. Usually it is necessary to grow the plant in plots or rows so that comparisons of strain may be made, but at the Seed Testing Station two laboratory tests are used to distinguish between different strains of white clover and perennial ryegrass.

With white clover the P.A. or picric acid test is used to distinguish between the vigorous, desirable leafy type and the poor, less desirable type of plant. The laboratory test consists of placing germinated seedlings into a test tube with a strip of yellow picric acid paper. The tubes are then incubated in an oven for 48 hours, after which they are graded according to the colour of the paper strips, the darker orange-brown indicating the better strain.

The U.V. or ultra-violet light test is used to distinguish truly perennial



The purity laboratory at the Seed Testing Station, Palmerston North, where highly trained seed analysts examine samples of seed for impurities.