

(b) Genetical Studies on Cyanogenesis in White Clover.

Detailed study of the inheritance of cyanogenesis to safeguard against the possibility of breeding towards an unduly high hydrocyanic acid (HCN) content in pedigree lines.

Differentiation of plant types into the following groups has already been established: (1) Those plants that contain enzyme and glucoside; (2) those that contain enzyme only; (3) those with glucoside only; (4) those with neither enzyme nor glucoside.

(c) Blind-seed Disease of Perennial Rye-grass.

Blind-seed disease of perennial rye-grass has again this season greatly reduced the yield of high germinating seed and it is the prime cause for the low stocks and high price that now obtains for certified perennial rye-grass seed.

Two modes of attack are being made to reduce the ravages of this fungus: (i) Selection for resistant types, and (ii) modification of field growth conditions to reduce the spread and infection to a minimum.

(i) *Work on Resistance.*—Field trials to date at Winton and Palmerston North have indicated a degree of resistance within some lines, and in the systematic search for material naturally resistant some three hundred seed lines have been sown out and these will be artificially inoculated with culture supplied by the Plant Diseases Division. Some seven hundred single plants have been inoculated to test the degree of resistance between different plants. The evidence to date is encouraging for the possibility of establishing resistant material that will form the basis of a pedigree line.

(ii) *Modifications in Seed-crop Technique in the Field as a Basis of Control.* Such modification is based on the ecological behaviour of the fungus under field conditions. From the above study the following modifications of field-crop technique are suggested:

- (1) The crop should be shut up early rather than late. Experiments on closing-up date for seed have been conducted at the Station over both the two past seasons and in each year the early shut up crops have given better germinations than the late shut up ones. The early shut up crops were also much freer of ergot. In both cases temperature may be the vital factor.
- (2) Those crops that had a dense sward bottom and which completely lodged gave a better germination than light crops with open sward bottom and which stood erect until ripening time. In the former case it is surmised that initial infection is low and the dense bottom inhibited the upward spore thrust from the apothecia situated on the soil surface, and that later when the crop is lodged the chance of secondary infection from wind-borne spores was minimized compared with the higher chance of infection in the standing crops. Seed-production trials are being extended, and a block of $1\frac{1}{2}$ acres of rye-grass has been differentially manured and will be differentially managed to give early to late closing up time, together with differential sward density.

(d) The Endophyte of Perennial Rye-grass.

The Plant Diseases Division has recently reported an endophyte fungus of perennial rye-grass. Nothing is known of its agronomic significance in regard to the plant itself or to the grazing animal. In co-operation with the Plant Diseases Division, investigations are now being extended to the study of these two problems.

Some six hundred single plants with and without endophyte infection have been planted out for observation and measurement. A field trial in co-operation with the Dairy Research Institute has been sown, and calves will be grazed on two areas composed of endophytic and non-endophytic rye-grass respectively.

(e) Nucleus Pedigree-seed Production.

The following crops for nucleus seed production are established at Palmerston North:

$1\frac{1}{2}$ acres perennial rye-grass.	$\frac{1}{4}$ acre short-rotation rye-grass.
$\frac{3}{4}$ acre Italian rye-grass.	$\frac{1}{4}$ acre crested dogstail.
1 acre white clover.	$\frac{1}{4}$ acre No. 2 white clover.
1 acre Montgomery red clover.	

Five acres of Italian rye-grass and $2\frac{1}{2}$ acres of short-rotation rye-grass are sown out for seed production at Lincoln.

(f) Cocksfoot-seed Production Trials.

Cocksfoot-seed production is on the wane in New Zealand, and this is largely as a result of decreasing yields of viable seed from the older-established areas. Trials have been laid down to investigate the cause of this decline and to test methods of seed production under differential treatments of the growing crop, of the aftermath stubble, and on manurial requirements. Seed production of a truly permanent stand as against more temporary stands in a definite crop rotation is being compared.

(g) Strain Testing for Certification Purposes and for Critical Examination of Bred Material.

To define and maintain standards for the certification of the following species: (1) Perennial rye-grass; (2) Italian rye-grass; (3) cocksfoot; (4) brown-top; (5) *Phalaris tuberosa*; (6) white clover; (7) Montgomery red clover; (8) broad red clover; (9) subterranean clover.