

roadside and permanent pasture plants. It would appear that there is a certain amount of selection going on in the permanent swards, and that as a consequence the very early flowering types are not well represented. This group flowered from two to six days after the commercial controls.

*Kentish*.—Here a big change in type is noted. The seeds are much slower to establish, and in consequence the autumn and early-spring growth-rates (when autumn-sown) are much below that of the commercial lines. Growth proceeds longer into the early summer, and the Kentish permanent-pasture lines were from seven to ten days later in flowering than the controls (New Zealand commercial). Their rate of autumn growth, combined with their close crown and abundance of fine narrow leaves, gives them a better appearance than the controls in April. By mid-winter and at the commencement of the active spring growth, the rate of growth of established plants is somewhat below that of the controls. These English lines are undoubtedly more persistent and leafy than the New Zealand commercial ones, but slower in growth.

*Scotch*.—Only two samples have been tried out, and these proved to be similar in type to the Kentish.

*Dutch*.—In respect of time of growth and growth characters, the Kentish lines can be regarded as only intermediate between New Zealand commercial and Dutch. The Dutch lines represent the extreme for slow growth from seed and lateness of spring production, there being a difference of fourteen days between the appearance of flower-heads of the earliest New Zealand commercial and the latest of the Dutch lines. Their winter production, too, is the lowest of the types tried out.

#### A CONSIDERATION OF THE VARIATIONS DESCRIBED.

The New Zealand types (1, 2, 3, 4) can be grouped together when considering the cause of the development of their specific characters. It seems very probable that when dogstail was first introduced into this country it was of the Kentish or Dutch type. Certain ecological factors began to work, and a distinct type is now present in roadside and permanent pastures from the original introduction. The types which were most suited to the environment came to be represented in greater numbers, so that although there are doubtless most of the original variants present, yet there has been a shifting of the centre of the aggregate of the observable characters. Owing to the greater competition from quickly growing grasses in this country, the smaller, slowly growing, fine-leaved, longer-lived strains have been at a disadvantage. Consequently a stemmy, broad-leaved, early-producing type has predominated which, incidentally, is not very persistent.

In addition to this natural move towards a less leafy but early strain, the method of harvesting the seed which was current until recently has helped to accentuate this character still further. Stapledon, Davies, and others have frequently shown that commercial lines of grasses tested at Aberystwyth and elsewhere have invariably developed parallel tendencies.