

Growth-form governs persistence or otherwise to a certain extent. Plants with their crown above ground are more liable to be eaten out by stock and are more susceptible to climatic changes, particularly in closely grazed pastures. With few exceptions pasture-plants that have their crown above ground disappear very rapidly from any pasture that is closely and continuously grazed. It has been pointed out before by the writer ("Grasslands of New Zealand" bulletin, p. 12) that the root-system of most grasses is not a permanent accessory to the plant. For each growing season a new root-system is developed, and in the case of grasses that have their crown above ground or at the surface such system has its origin from a node of the creeping-stem of the grass, or from the base of the crown at or immediately below the soil-surface. Drying winds and intense light at the soil-surface hinder the development of new roots, and consequently the growth of the plant is retarded. Close and continuous grazing, therefore, must be regarded as an undesirable practice where it is desired to retain pasture species that have their crown at or above ground-level. With those species that have their crown well below ground and which spread by means of long underground stems or by short underground tillers, close grazing, with its attendant desiccating conditions at the surface, does not affect the system of the plant in the same way. Also, when the root-system is deeper in the soil periodical spells of dry weather have little effect in promoting change in the composition of such pastures.

On hill country and on other difficult soils, such as sand country, peat swamps, &c., where it is extremely difficult, irrespective of what quantity of seed is sown, to get anything like a complete sward right from the offset, the growth-form of the plants sown is of much importance. Tussock-forming or tufted plants, unless of a free-seeding nature, are incapable of much lateral spread, and consequently those places where seed-establishment is impossible, owing to the loose spongy nature of the soil or to its hard and dry surface, either remain open bare patches or become invaded by fern, piripiri, manuka, catsear, or other weeds. In the case of those plants with underground stems or with underground tillers, bare and difficult places in the area sown may ultimately become covered by such plants, which have the means whereby lateral spread is possible. On steep hill country also, where stock readily cut the turf about by their treading, and where soil-movement is rapid once the surface is bared of vegetation, binding grasses are essential. Most of the higher-production grasses that one would like to retain on hill country are of the tufted form, and the binding of these by other pasture-plants to render their displacement more difficult is very worthy of consideration. Again, in the early primary-forest burn, where fertility is high, the tufted-nature plants may grow to a great size and completely cover the ground surface. Then, as soon as depletion of fertility begins, a corresponding shrinkage in size of the tufted plants takes place. Bare spaces appear in the pasture, and here, again, is needed the underground tiller, or the underground creeping-stem, or the overground creeping stoloniferous plant, to fill up these gaps in the turf as shrinkage in size of the tufted plants takes place.

In the sowing-down of arable land to pasture, again, growth-form should be considered, particularly so in districts where pastures are