Macedon Ranges Shire Council

Information Sheet **1**

Classification and Form of Grassland Species in a Grazing Ecosystem

Summary

- Grazing ecosystems are made up of grasses, forbs and legumes.
- Pasture/grassland plants are perennial or annual.
- A select number of species prefer warmer climates (C4) while most others, a temperate climate (C3).
- Growth forms are tufted (or bunch-type), stoloniferous and taproot.
- Plant size is determined by temperature, light, moisture, species and fertility.

Pasture diversity: grasses, forbs and legumes

A pasture/grassland is made up of a diverse range of species. These can be classified in a variety of ways. These information sheets will use the following classifications:

- Grasses – defined as a plant with hollow and jointed stems, and narrow sheathing leaves. They consist of plants such as wheat, rice, bamboo, sugar cane as well as ryegrass, fescue and kikuyu.
- Forbs – generally a broadleaf herbaceous plant in a grassland that is not grasses. Commonly used to describe – in a pasture context – plants such as plantain, capeweed and chicory. Legumes are also a forb, although often separated in a pasture context.
- Legumes – typified by herbaceous plants, shrubs, trees and vines having usually compound leaves. Includes beans, peas, acacia, lucerne and clover.

Growth type

'Perennial' refers to the ability of the plant to grow longer than two years. Perennial plants traditionally dominated grasslands, due to their root systems which can withstand a greater variety of weather conditions. Many grassland perennial plants can reproduce from seed and established grasses also use the process of tillering (see Information Sheet 2).

Annual plants' long-term survival relies on quickly completing the lifecycle in favourable conditions – seed germinating, plant growing and seed setting.

Grasses can be split into C3 or C4 categories due to the photosynthetic pathway used for carbon fixation. The C4 pathway requires higher temperatures and uses water efficiently compared to the more ancient C3

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pathway. Hence, in certain climates, having a diversity of these species that grow at different times of the year allows the sunlight to be captured and converted into leaf year round which benefits the soil.

The temperate or cooler climate species, C3 consists of the greatest variety of the world's grasses which grow best in soil temperatures of 10-18 degrees Celsius. The warmer/summer species C4 grasses appreciates soil temperatures of 18-30C.

Annual cool-season (C3) – wheat, winter grass (*Poa annua*), oats, capeweed

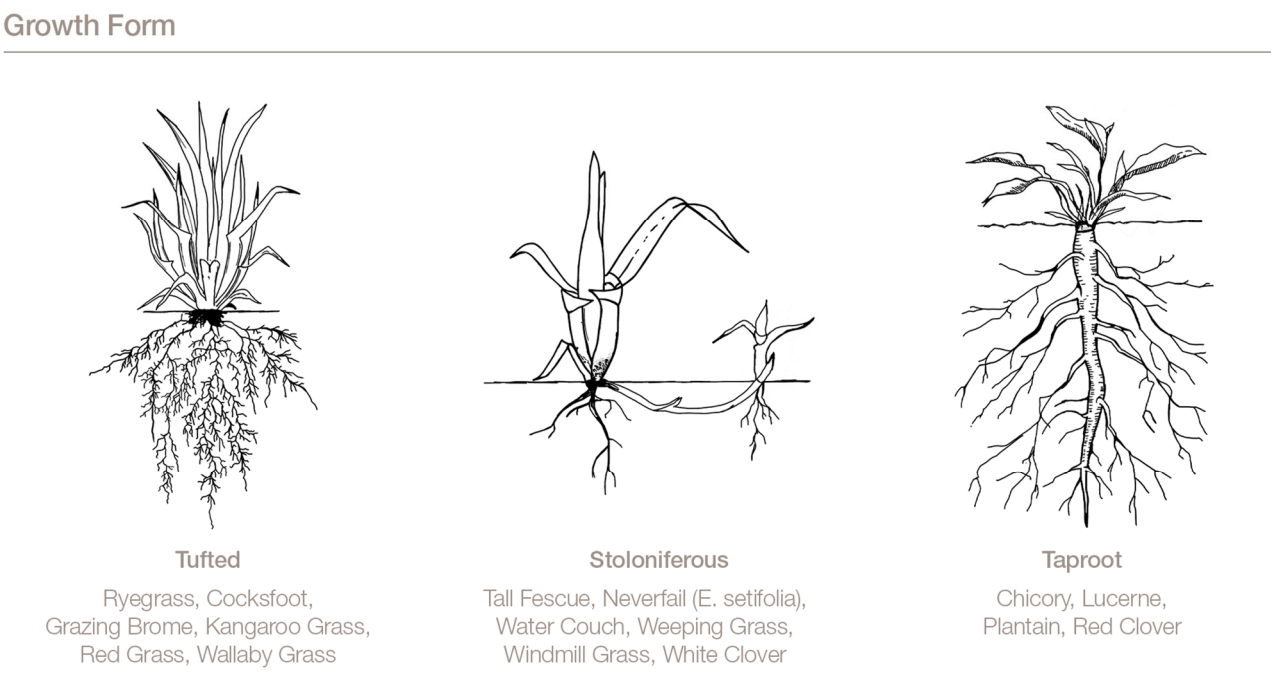
Perennial cool-season (C3) – perennial ryegrass, prairie, cocksfoot, and the Australian native weeping grass

Annual warm-season (C4) – maize, millet

Perennial warm-season (C4) – paspalums, couch, lucerne, kangaroo grass.

Growth form

The growth form of grasses and forbs can be divided into three general classifications: **tufted** (or bunch-type); **stoloniferous**; and **taproot**. These classifications are a guide to understand how the plant replicates through the grasslands, tillers and responds to grazing. Grassland ecosystems contain this diversity of growth form as each one has preferential environments at differing times which maintain a healthy ecosystem.



Common examples of the tufted form are ryegrass, cocksfoot, phalaris and the Australian natives, kangaroo, wallaby and red grass. Examples of stoloniferous are tall fescue, kikuyu, water couch, white clover and the Australian natives, neverfail and weeping grass. The taproot form includes lucerne, chicory, plantain, radish and turnip.

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Growth factors

Plant size is determined by temperature, light, moisture, soil fertility and species. Without massive investment these plant growth factors cannot be controlled, but some examples where management decisions can influence these factors, and affect plant growth rates, include**:**

Temperature – individual plant species will have their optimum temperature; too high or too low limits the growth of the plant. As mentioned above, C3 or C4 plant species will determine their preferred temperature. Shelter belt positions impact soil temperature. The water-holding capacity of soils, which can be influenced directly by management combined with soil structure, also impacts soil temperature and plant growth. An example is a high clay or high organic matter soil which will respond more slowly to temperature changes as it has higher water and less air content within the soil compared to a sandy, low organic matter soil.

Notably, grazing management decisions also have an impact on soil temperature by:

- impacting the leaf size
- the amount of soil organic matter
- the percentage of perennial plants covering the soil surface
- and amount of bare earth.

Light – can be influenced strongly by grazing, ensuring light is hitting leaf surface rather than bare ground (more detail in Information Sheet 2).

Moisture – can be controlled through irrigation. The make-up of a soil structure and amount of carbon in the soil has an impact on the amount of moisture a soil has the ability to retain (its water-holding capacity). Grazing impacts the depth and amount of the root biomass within the soil to access moisture.

Soil fertility – the readily available nutrients the plant requires for growth. The depth and amount of the root biomass to access nutrients is critical in plant growth and is influenced by management.

Species – each plant species has its optimum growth conditions. Research shows that a diverse range of species can assist the increase of the overall production of herbage on a soil.

For more information, email **environment@mrsc.vic.gov.au** or call 5422 0333.

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