

Grassland / Turf Growth Models. – Thermal Index

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Basic plant requires light (thermal), water, air, and nutrients to develop, grow and reproduce. It is the interactions of these requirements that either limit plant growth or allow growth to the plant's maximum growth potential.

As there are many variants within the perceived GROWTH INDEX (GI) model such as a LIGHT INDEX (LI), THERMAL INDEX (TI), MOISTURE INDEX (MI) and NUTRINT INDEX (NI - plant nutritional status).

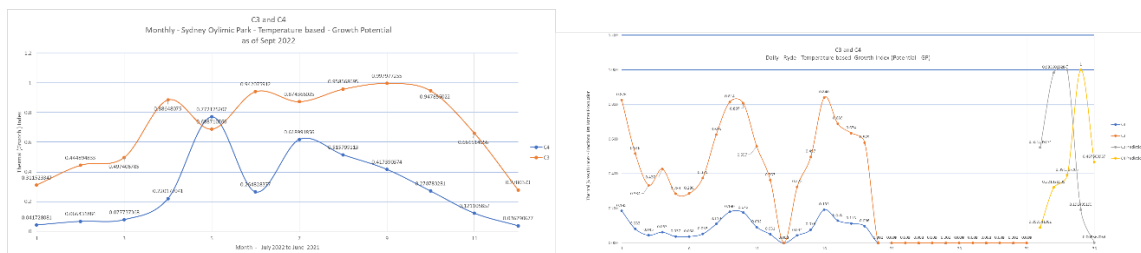
In a simplistic form it can be written as:

$$GI = LI \times TI \times MI \times NI$$

As, like many models they need to be ground truthed against your local observation. As many grassland studies have been conducted over the last 120 odd year mainly done for pasture growth some data is available to work with, particularly for the Thermal Index.

The Thermal Index is basically the potential of a plant (C3, C4 or specific species) to growth on a scale of 0 to 1 (or 0% to 100%) based on the average temperature.

These indices can be used to provide insights the past, current, and future trends for a plant's growth.



Left: Running C3/C4 monthly TI: July – Sept 2022 thence Aug – June 2021.

Right: Daily C3/C4 Day 1 to 12 measured. Day 13 to 19 Predicted. With C3/C4 Cross over

Plant growth does relate to many management practises like:

Grazing Mowing Fertiliser Establishment Practises Turf – Renovation
Practises Irrigation

The thermal indices provide a reasonable tool for management subject to your knowledge and needs.

References:

Fitzpatrick and Nix. 1975. The Climatic Factor in Australian Grassland Ecology. Pg 3-26 In in Australian Grasslands Ed Moore.

Williams. 1975. The Shoot Apex and Leaf Growth.