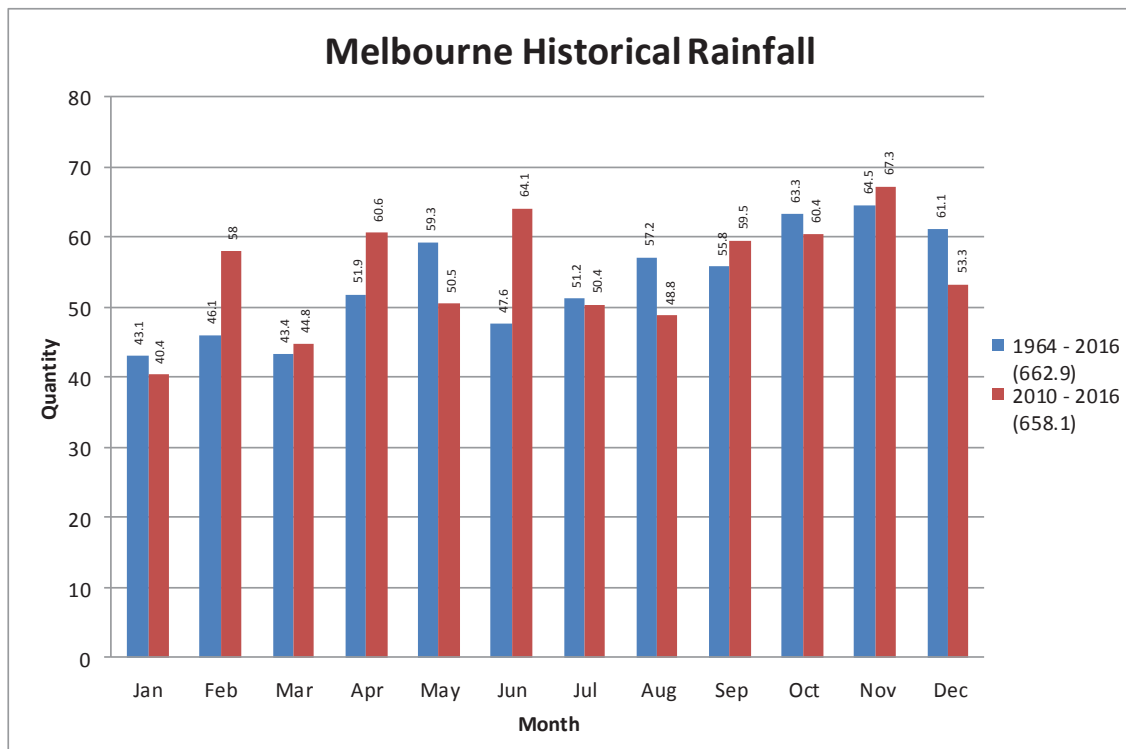
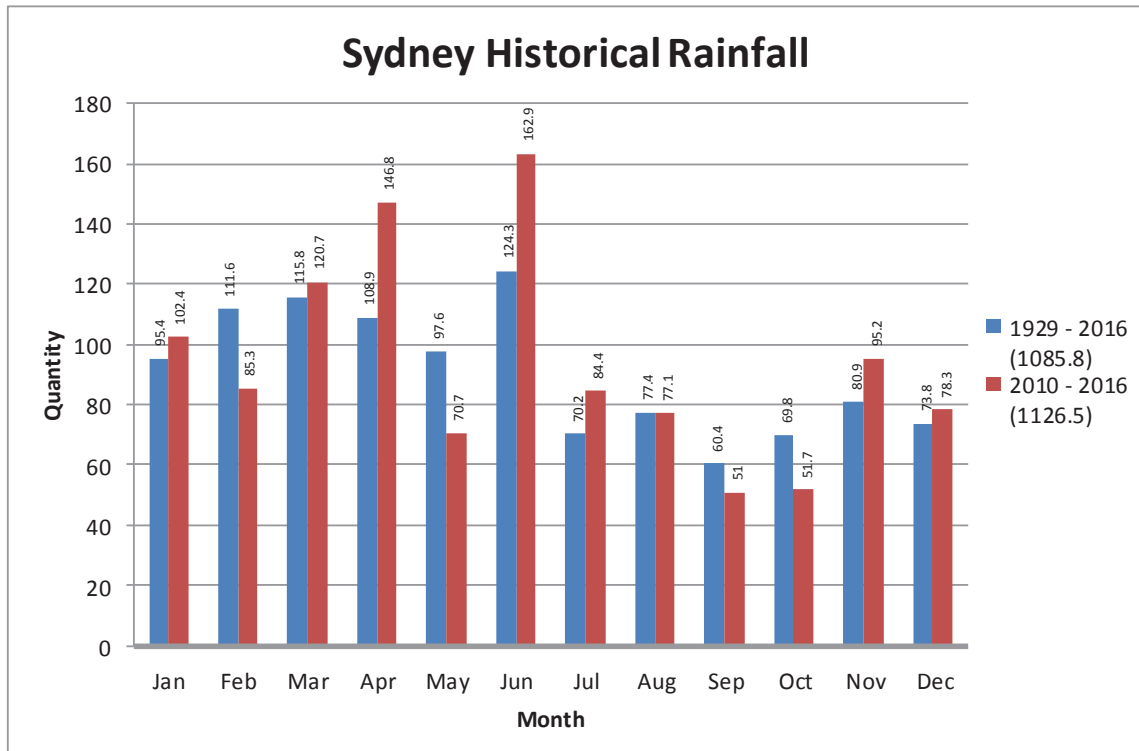
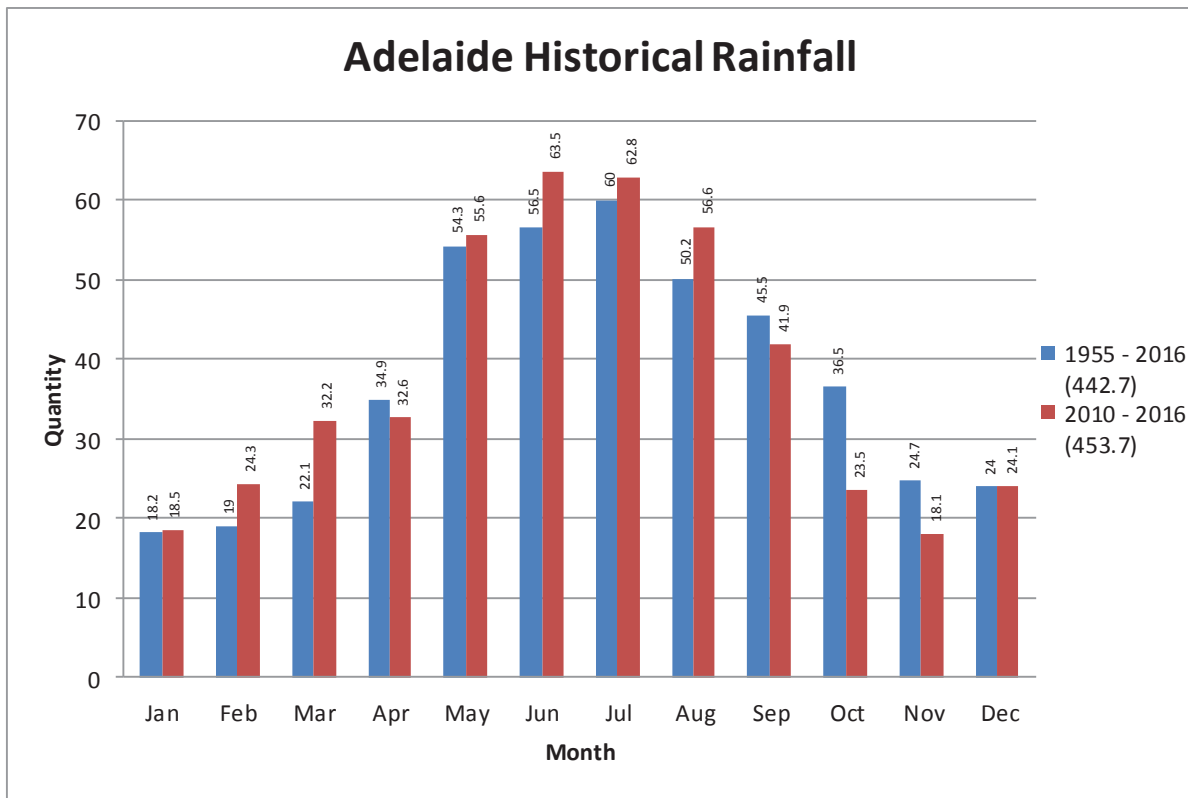
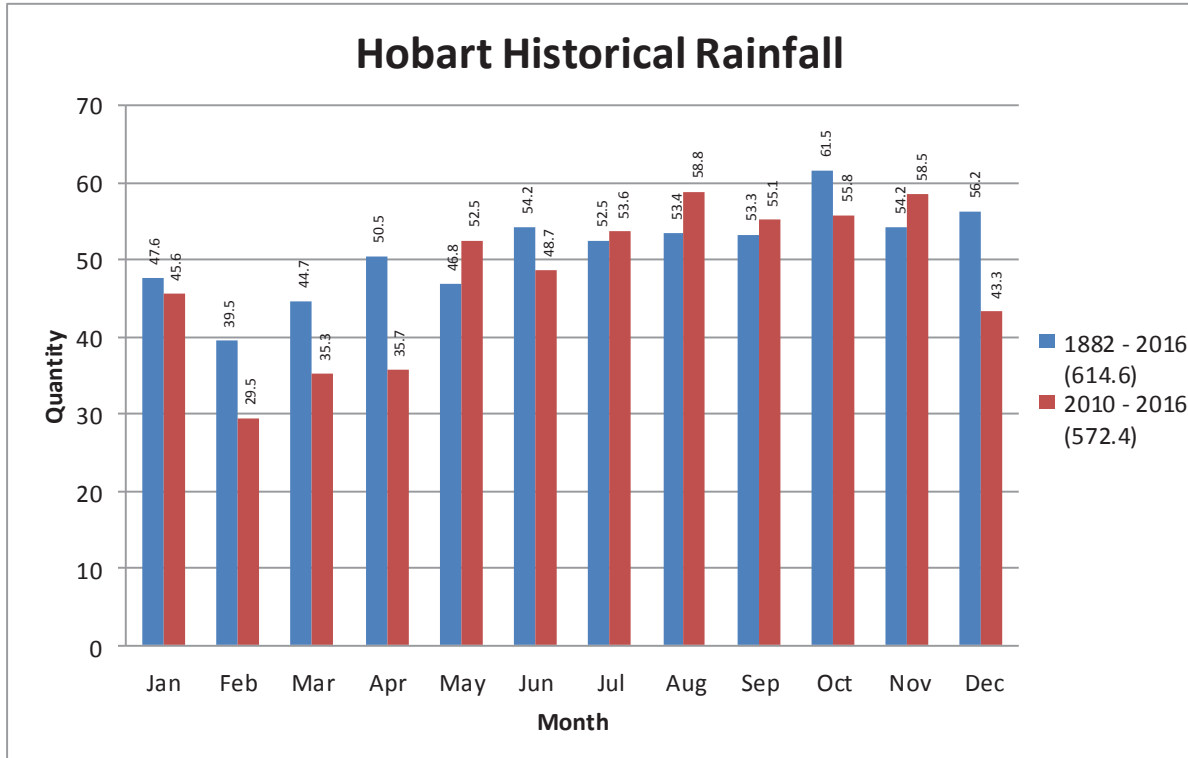


Benefits of Amino Acid and Micro-Nutrient Application

Historical Rainfall

In many parts of eastern and southern Australia, the period of autumn and winter tends to bring increased rainfall. Trend graphs from major cities show the increases generally seen.





Application

In optimum growing conditions, the turfgrass plant is able to biosynthesise the required amino acids for required carbohydrate production through a number of processes. When these conditions change, or when the plant is placed under stress, then additions of **amino acids are useful to help supplement the plant and maintain strength**. The typical trend in changing conditions over the upcoming cooler months with increased rainfall is lower light intensities associated with the increase in cloud cover.

Applications of FoliMAX Amino+ prior to, and during this period can assist your turf by:

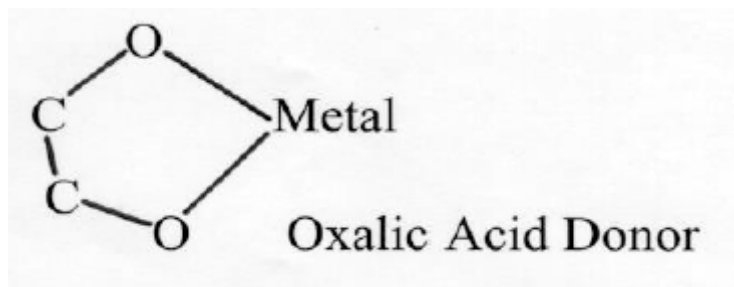
- **Increasing chlorophyll concentration in the leaf.** The conversion of energy from light in association with carbon dioxide and water occurs within the chloroplast where chlorophyll pigments are contained. Glutamic acid and Glycine are fundamental amino acids required for chlorophyll production. By increasing chlorophyll production in the leaf, amino acids can in part **counter the effects of lower light levels** and assist with energy production during photosynthesis.

- **Providing additions of complex sugars and Vitamin B1.** Carbohydrate reserves in plants are very important in times of stress and exist as mainly fructosans and starches. While carbohydrates are stored in various parts of the plant such as the roots, stolons, rhizomes, stem and leaf bases, they are only produced in shoot tissues. Because of this, these tissues have first priority of the reserves. Should photosynthesis levels fall due to poor light or shoot damage from other stress factors, thereby impacting on production of carbohydrates, then growth of the root system will start to become compromised as it only receives carbohydrates once shoot growth needs are sufficient. **This is, in part, why we see shallower root structures in low light conditions.** The role of the Vitamin B1, or Thiamine, is for assistance in metabolism of these carbohydrates.

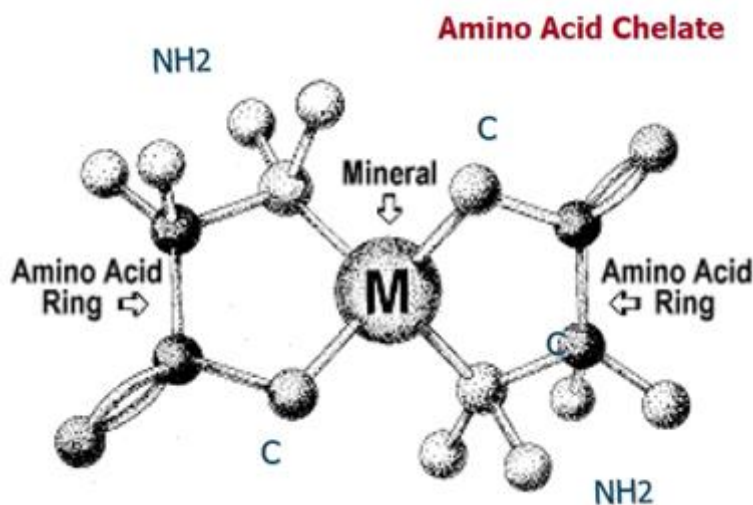


Amino Acids

Amino acids, being an organic acid, also play a role in nutrient chelation. Complexes such as EDTA are synthetic, and whilst very effective in the soil, only attract metals (Fe, Mn, Cu, Zn). They slow the release by attracting the metal and donor atoms to each other in a simple structure which looks like the following:



Amino acid chelates form a very strong bond around the mineral. Organic acids have an advantage over inorganic forms as they degrade in the soil and in doing so assist in providing an energy source to soil micro-organisms. Plus they work in chelation of a wider range of nutrients.



Micronutrient management in cooler weather is important through availability and delivery. As soils cool, micronutrient availability can be reduced via a number of factors.

For instance, Mn uptake is reduced due to lower plant metabolism, while others like Zn are reduced due to lower solubility.

Microbial activity which can be involved in nutrient solubilisation is slowed in cooler soils whereby activity is reduced due to temperature.

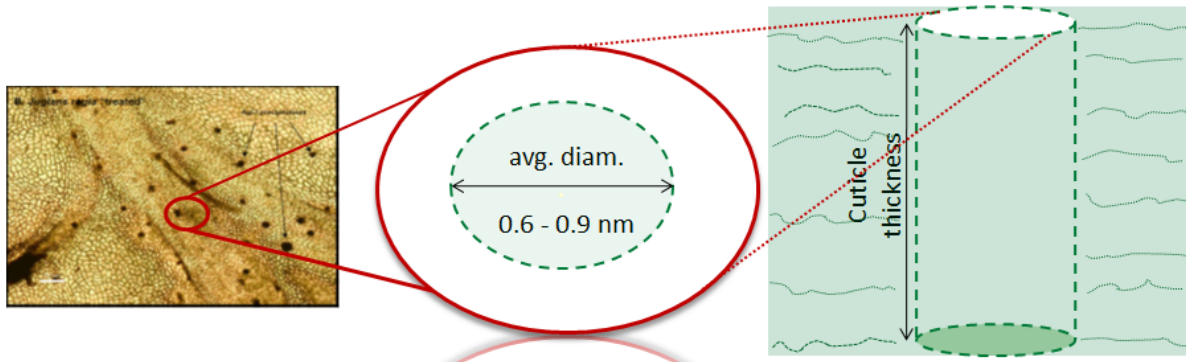
Table 15.2. influence of temperature on soil micro-organism activity.

°F	°C	Relative Microbial Activity	
32	0	1	(4%)*
50	10	3	(11%)
55	12.7	4.6	(17%)
68	20	9	(33%)
86	30	27	(100%)

* Numbers in parentheses are percentages of maximum activity measured at 86°F.

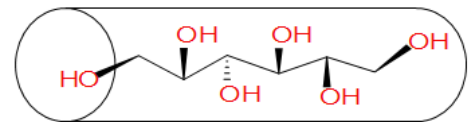


Delivery then during cooler periods is effective via foliar means. **FoliMAX Trace+** is ideal for this period as the Nutrex delivery system is in part chelates nutrients through sugar alcohol technology. Within the leaf cuticle are pores known as ectodesmata, or aqueous pores, which have pore diameters of approximately 1 nanometre (one billionth of a metre or 10^{-9}).

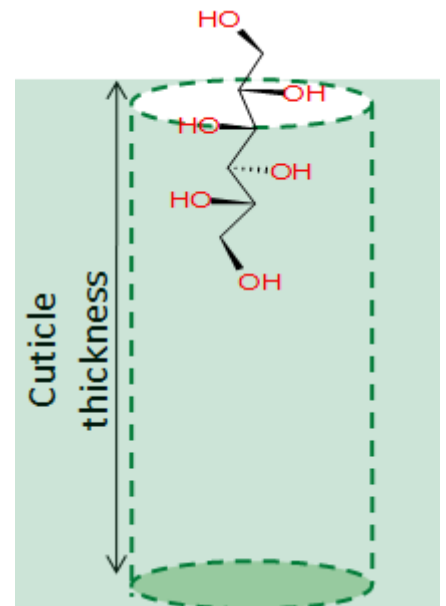
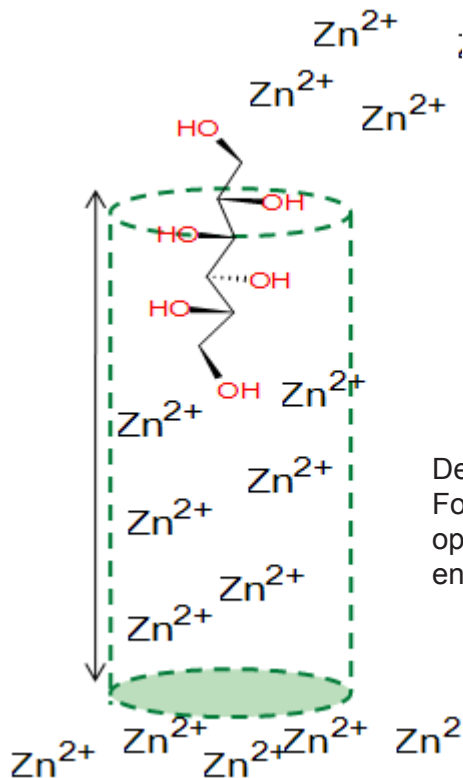


Valency plays a role in the size of the hydrated molecule. The rate of cuticular permeation decreases as hydration diameter (size) of cations increases. For divalent cations, increased hydration weakens the charge strength and promotes greater penetration, but also increases size. The sugar alcohols in Nutrex assist in this manner as they have extremely small dimensions and the lowest molar mass but more importantly have a different structure.

Sugar Alcohols



Their structure enables the micronutrient to be effectively transported into the leaf as there are several polarity points along the molecule which allow the nutrient to bind to.



Delivery and plant use is therefore maximised. Both **FoliMAX Amino+** and **FoliMAX Trace+** are an excellent option for turf health during cooler periods and is encouraged.

