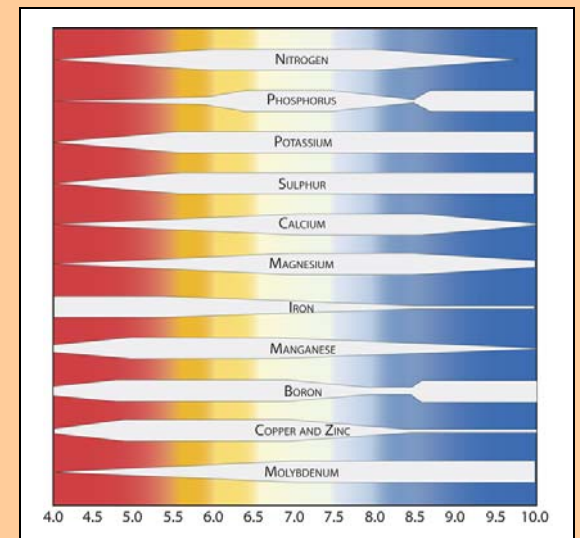


# NUTURF AUSTRALIA NUTRITION GUIDE

## The 16 Essential Nutrients for the nutrition of Turfgrasses

Nutrient	Symbol	Atomic Mass	Positive (+) Charge	Negative (-) Charge	Valency	Mobility in Plant
<b>Macro-nutrients</b>						
Carbon	C	12.01				Obtained from CO <sub>2</sub>
Hydrogen	H	1.01				Obtained from H <sub>2</sub> O
Oxygen	O	16.00				Obtained from CHO & H <sub>2</sub> O
Nitrogen	N	14.01			Various	Mobile
Phosphorus	P	30.97		-	4	Mobile
Potassium	K	39.10	+		1	Mobile
Calcium	Ca	40.08	+		2	Immobile
Magnesium	Mg	24.31	+		2	Mobile
Sulfur	S	32.07		-	2	Partially mobile
<b>Micro-nutrients</b>						
Iron	Fe	55.85	+		2 or 3	Immobile
Manganese	Mn	54.94	+		2	Immobile
Zinc	Zn	65.39	+		2	Partially mobile
Copper	Cu	63.55	+		1 or 2	Partially mobile
Molybdenum	Mo	95.94		-	2	Partially mobile
Boron	B	10.81		-	2	Partially mobile
Chlorine	Cl	35.45		-	1	Mobile

## Nutrient Availability as influenced by soil pH



## Recommended Fertiliser Rates

Nutrient	Minimum kg/Ha/Yr	Maximum kg/Ha/Yr
Nitrogen	160	400
Phosphorus	30	50
Potassium	80	240

(Handreck and Black, 1994)

General Fertiliser Requirement	
Warm season Turfgrasses	
Kikuyu	Low - Medium
Couch	Low - Medium
Buffalo	Very low
Zoysiagrass	Low - Medium
Cool season Turfgrasses	
Bent	Low - High
Ryegrass	Low - Medium
Fescue	Low

(Duncan and Carrow, 2001)

## Ideal Phosphorous Levels (Melich 3)

Rating	PPM
Very Low	0 - 12
Low	13 - 26
Medium	27 - 54
High	55 - 100
Very High	250 +

(Duncan et al, 2004)

## Conversion of PPM to Meq/100g or Meq/L

Nutrient	Divide PPM by below number to obtain Meq/100g*	Divide PPM by below number to obtain Meq/L*
Calcium	200	20
Magnesium	120	12
Potassium	390	39
Sodium	230	23

\* To obtain PPM from Meq/100g multiply by the above figures.

## Base Saturation Ideals

Nutrient	%
Calcium	68 -- 72%
Magnesium	13 -- 16%
Potassium	3 -- 5
Sodium	< 3
Hydrogen	4.5
Other Cations	5

## Sufficiency Levels for Turfgrass Growth

Nutrient	PPM Ideals
Calcium	750 - 1000
Magnesium	150 - 200
Potassium	130 - 160
Sodium	Less than 50 ppm

## Mechanisms for Nutrient Release of CRN Fertilisers

Fertiliser	Temperature	Moisture	Microbial
Poly Sulphur Coated Urea		X	X
IBDU		X	
Methylene Urea			X
Urea Formaldehyde			X
Resin Coated	X	X	

## Optimum Temperatures for Growth (Degrees Celcius)

Type	Roots (Soil)	Shoots (air)
Cool Season (C3 Grass)	10 -- 18	16 -- 24
Warm Season (C4 grass)	24 -- 29	27 -- 35

(Adams, Gibbs: 1994)

## Turfgrass Fertilisers: Salt Index

Natural Carriers	Salt Index
Natural Organics	4
IBDU	5
Urea Formaldehyde	6
Urea Formaldehyde	75
Ammonium Nitrate	105
Ammonium Chloride	120
Sulphate of Potash	46
Muriate of Potash	115
Di-ammonium Phosphate	34
Superphosphate (triple)	10
Phosphoric acid	110
Magnesium Sulphate	44
Ferrous Sulphate	85

**Nuturf Analytical Services**  
 Soil Analysis  
 Plant Tissue Analysis  
 Irrigation Suitability Analysis  
 Saturated Soil Analysis

## Specialists Providing Solutions

Nuturf - Nutrition Services Team	
	Chris Chapman (B. Agr. Sci) National Business Manager - Nutrition
	Paul Looby (B. Agr. Sci) Technical Agronomist
	Shane Harvey (B. Sys. Agr.) Technical Agronomist
	Peter Kirby (M. Agr., B. App. Sci) Technical Services Manager

## Nutrient Deficiency Symptoms

Nutrient	Leaf Age most Affected	Yellowing	Purpling	Interveinal	Scorched	Mottling	Stunted	Red/Brown	Twisted	Wilting	White/Bluish	Green/Gray	Stunted
Nitrogen (N)	Oldest	X					X						
Phosphorus (P)	Oldest		X				X						
Potassium (K)	Oldest			X	X				X	X			
Calcium (Ca)	Youngest							X	X				X
Magnesium (Mg)	Oldest	X		X				X					
Sulfur (S)	Youngest	X		X			X						
Iron (Fe)	Youngest			X		X					X		
Manganese (Mn)	Both			X		X				X		X	
Zinc (Zn)	Both	X				X			X				
Copper (Cu)	Youngest	X				X			X		X		
Molybdenum (Mo)	Oldest	X		X		X							
Boron (B)	Youngest			X					X				X
Chlorine (Cl)	Youngest	X							X	X			

## Amendment Guide

Product	Ca	Mg	K	P	S	Neutralising Value
Calrite	38.8					0
Gypsum	21				18.6	0
Lime	35 -- 38					85 - 100
Dolomite	21	12				95 - 108
Hy-Mag	15	17				
Keiserite	0	15				
Magnesium Sulphate	0	15				
Magnesium Carbonate		21 - 27				
Potassium Sulphate			41			
Potassium Nitrate			37			
Potassium Carbonate			48			
Monoammonium Phosph.				22		
Diammonium Phosphate				20		
Supa Stand Phos				10		



For more information on your soil and water analysis needs contact your local Territory Manager or the Nuturf Technical division on 1800 631 008

