FACT SHEET

NO: 014
Date: February 2011

Turf Queensland
Grow Green

DETERMINING SOIL TEXTURE

Soil texture is an important soil property to understand for agricultural and farming-related activities. The texture of a soil influences how much water a soil can hold. A clay rich soil holds more water than a sandy soil, which means that a clay rich soil should be watered less frequently with more water during each irrigation event. A sandy soil should be watered more frequently with less water during each event. There are many techniques used to measure soil texture.

(Source: How to **determine soil texture**. http//:www.farmscape.cse.csiro.au)

Ball	Ribbon (cm)	Feel	Texture
Will not form a ball	0.5	Single grains of sand stick to fingers	Sand (S)
Ball just holds together	1.5 – 2.5	Feels very sandy, visible sand grains	Loamy Sand (LS)
Ball holds together	1.5 – 2.5	Fine sand grains can be felt	Fine Loamy Sand (FLS)
Ball holds together	2.5	Spongy, smooth, not gritty or silky	Loam (L)
Ball holds together	2.5	Slightly spongy, fine sand can be felt	Loam Fine Sand (LFS)
Ball holds together	2.5	Very smooth to silky	Silt Loam (SL)
Ball holds together strongly	2.5 - 4	Sandy to touch, mediums sand grains can be felt	Sandy Clay Loam (SCL)
Ball holds together	4 – 5	Plastic, smooth to manipulate	Clay Loam (CL)
Ball holds together strongly	5 – 7.5	Plastic, smooth, slightly resistant to shearing between thumb and forefinger	Light Clay (LC)
Ball holds together strongly	> 7.5	Plastic, smooth, handles like Plasticine, can be molded into rods without fracture, moderate shearing resistance	Medium Clay (MC)
Ball holds together strongly	> 7.5	Plastic, smooth, handles like Plasticine, can be molded into rods without fracture, very firm shearing resistance.	Heavy Clay (HC)

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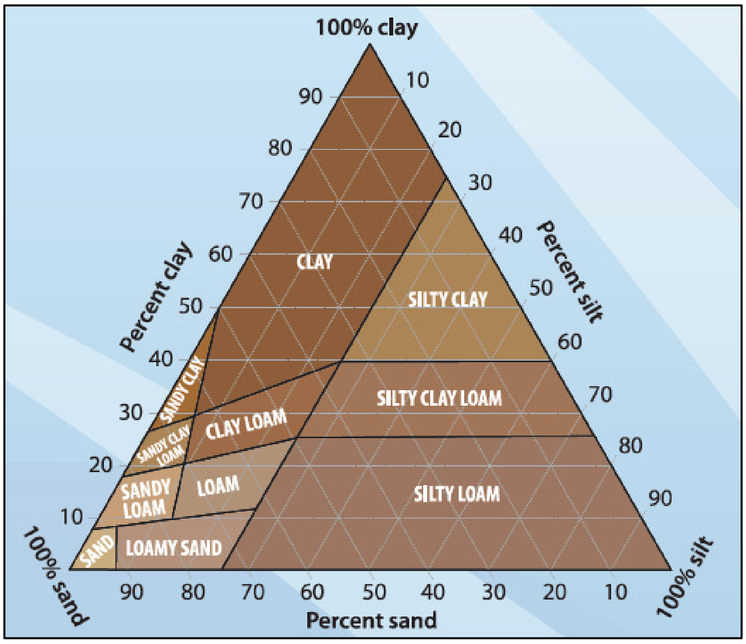
GUIDE TO SOIL PROPERTIES



(Source: *Measuring Soil Texture In The Laboratory.* Holbeche, Georgina. The University of Western Australia. - soilquality.org.au)

SOIL TYPE	AVAILABLE WATER (AW)	INFILTRATION RATE (i)
	mm/m	mm/hr
Sand	60	>20
Fine Sand	90	15-20
Sandy Loam	110	10-18
Loam	170	10-15
Silt Loam	170	8-12
Clay Loam	165	5-10
Clay	140	1-5

(Source: (1) *BEST PRACTICE GOLF WATER MANAGEMENT FACT SHEET No. 1*
Best Practice Turf Irrigation Management, Connellan. G. Burnley Campus. University of Melbourne. December 2005)

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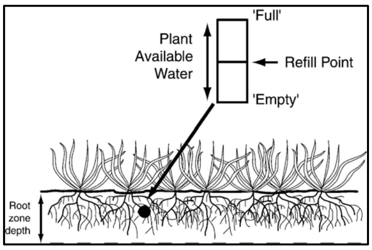
DETERMINING PLANT AVAILABLE WATER



Root zone depth

Sample - Turf growing in sandy loam soil

Root zone depth (D): **150 mm**
Available Water holding capacity (AW): **110 mm per 1000 mm**
Stored Water or Plant Available Water = **150 mm x (110 /1000) = 16.5 mm**

Stored Water is used to determine the depth of irrigation that should be applied. In this case **16.5 mm** is the maximum that can be applied to a dry soil. In order to calculate the desired Irrigation Depth, there are two aspects that need to be considered the Refill Point and the System Application Efficiency.

DETERMINING IRRIGATION DEPTH

The irrigation system needs to apply a depth of water to both refill the soil storage and allow for the inefficiency of the irrigation system.

Irrigation depth (mm)

= Percentage Allowable Depletion (%) x P A W
Application efficiency (%)

Note: Efficiency is expressed as a decimal...
i.e. **75% = 0.75**.

Example - Irrigation depth:
Turf: Turf in **Sandy Loam**
P A W: **16.5 mm**
Percentage Allowable Depletion (PAD): **50%**
Allowable depletion depth: **16.5 x 50% = 8.3 mm**
Application efficiency: **75%**
Irrigation depth: **(0.5 x 16.5) = 11.00 mm**
0.75
In this situation the irrigation system will need to apply 11.00 mm to ensure that **8.3 mm** is delivered to the turf root zone.

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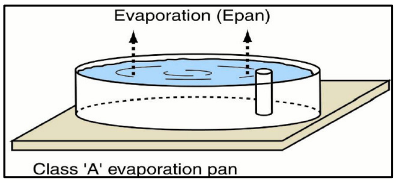
ESTIMATING WATER USE

EVAPOTRANSPIRATION (ET)

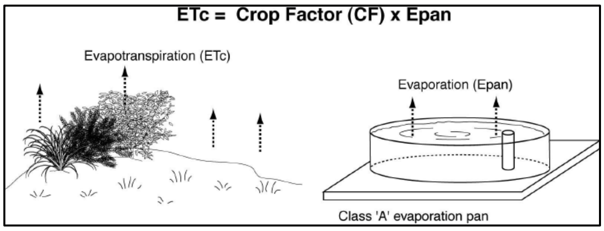
–The sum of the water lost from the soil surface (evaporation) and water used by plants (transpiration).

Two Estimation Expressions

(1) Evaporation pan reference
Bureau of Meteorology Instrument



(2) Evapotranspiration reference
The Evaporation Pan Expression



PLANT — Crop Factor (CF) range

	LOW	HIGH
Turf – warm season e.g: Buffalo, Couch, Kikuyu, Zoysia.	0.25	0.7
Moderate growth, just acceptable	0.25	0.40
Strong growth	0.25	0.55
Vigorous growth	0.55	0.70

Calculations

Sample – Kikuyu
Crop Factor (CF): 0.55
(vigorous growth LOW CF or strong growth HIGH CF)
Evaporation: 8mm per day
(reading from Class A pan)
ETc: 8 x 0.55 = **4.4 mm per day.**

If ETc = 4mm per day…with Allowable depletion of 8.3mm at root zone.
Then @ 8.3mm (root zone depth) / 4mm (per day)
= Irrigation Interval (Ti) = 2.1 days.
This means the irrigation interval is every 2 days.

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