

## Calculating the appropriate depth of irrigation

1. Determine what field capacity is (see table below)
2. Determine what permanent wilting point is (see table below)

Texture	FC (%)	PWP (%)	Texture	FC (%)	PWP (%)
Sand	10	5	Silt loam	31	11
Loamy sand	12	5	Silt	30	6
Sandy loam	18	8	Clay loam	36	22
Sandy clay loam	27	17	Silty clay loam	38	22
Loam	28	14	Silty clay	41	27
Sandy clay	36	25	Clay	42	30

Take a silt loam (the majority of soil types in N. Otago) for example where:

$\Theta_{FC} = 31\%$  (determined from soil drying or tables)

$\Theta_{WP} = 11\%$  (determined from soil drying or tables)

3. Calculate total amount of water available to plants within the soil profile, this is the 'total available water (TAW)' and is calculated by:

$$\mathbf{TAW} = \Theta_{FC} - \Theta_{WP} = 31 - 11 = 20\%.$$

4. Determine the soil depth to which the water is applied, for instance in Pallic soils this is may be determined based on the depth of the topsoil 400 mm, or in other soils the rooting depth of the crop.

Assuming a rooting depth of grass to be 0-300 mm

TAW = 20 % (from 3)

**TAW** = 0.20 x 300

= 60 mm

5. Irrigation point (IP) is the moisture content at which irrigation should be applied. This is generally taken as a half way point between  $\Theta_{FC}$  and  $\Theta_{WP}$ .

$$\mathbf{IP} = \text{TAW} / 2 + \Theta_{WP}$$

$$= 20/2 + 11$$

$$= 21$$

When soils reach 21 % (i.e. the IP) then we must re-fill to  $\Theta_{FC}$  (which is 31 %).

This is achieved by adding 10 % more moisture.

10 % of 300 mm = 30 mm

1 L applied over 1 m<sup>2</sup> = 1 mm, so 30 mm over 1 ha (10 000 m<sup>2</sup>) = 300 000 L or 300 m<sup>3</sup>.