Water for Profit

ESTIMATING THE LEVEL OF SALT IN THE CROP ROOT ZONE

WATERFORPROFIT

All water contains some salts. When water is taken up by crops, much of the salt is left behind in the root zone. If this salt is not removed, then the salt concentration in the root zone will build up and affect crop growth and production.

Introduction

To prevent crop damage, the salt in the root zone must be removed by leaching (i.e. flushing) with either natural rainfall or irrigation. The potential long term damage caused by poor quality irrigation water can be estimated if both the quality and quantity of the water entering and draining out of the bottom of the root zone are known.

Calculating the average water quality entering the soil

In the long term, both rain and irrigation will infiltrate into the soil and contribute to the root zone salinity. The electrical conductivity of the water entering the soil (ECw) should be calculated using the infiltrated rainfall and irrigation volumes. Where there is no substantial surface runoff or evaporative losses from irrigation (e.g. drip or micro-sprinklers), the applied irrigation can be assumed to completely infiltrate. Similarly, in the long term the proportion of infiltrated rainfall is commonly assumed to be 80 per cent of the total rainfall. Hence, if you normally apply approximately 700 mm/yr of irrigation water with an EC of 2.6 dS/m, and the field also normally receives approximately 1000 mm/yr of rainfall (assume an EC of 0.04 dS/m), then the average ECw would be equal to (700 x 2.6 + 0.8 x 1000 x 0.04) / (700 + 800) = 1.2 dS/m.

Calculating the amount of drainage beneath the crop root zone

The amount of drainage beneath the crop root zone can be calculated as the difference between the total infiltrated volume and the estimated crop water use during the period. For example, if the typical crop water use is 900 mm/yr and the total volume of water infiltrated into the soil was 1500 mm/yr, then the proportion of the infiltrated water which ends up as deep drainage can be calculated as (1500 – 900) ÷ 1500 = 0.40 or 40 per cent.

Estimating the long term salinity level in the crop root zone

Using the average water quality (i.e. weighted average of rainfall and irrigation water) entering the soil, the estimated drainage beneath the root zone and Figure 1, it is possible to estimate the average long term salinity level in the crop root zone. Compare the estimated long term ECse with the 'no yield reduction' threshold for your crop. If the long term estimated ECse is greater than the threshold for the crop, then it is time to reconsider the use of poor quality irrigation water and/or irrigation management practices being used.

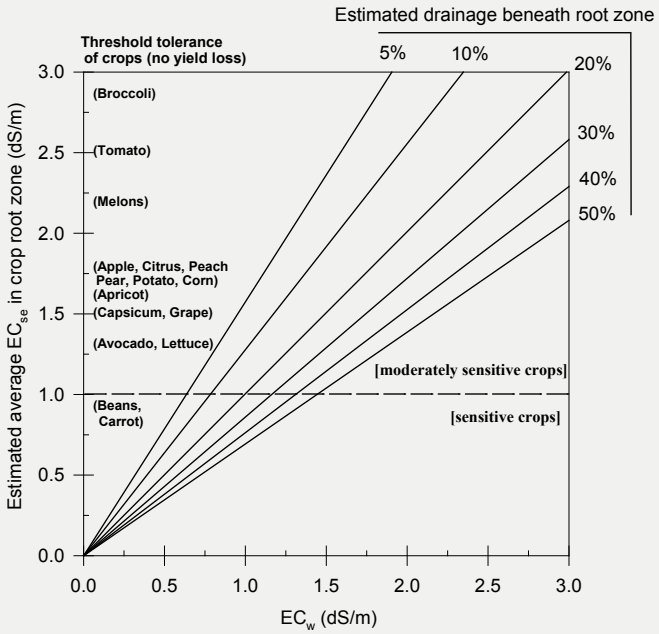

Figure 1: Estimating long term salinity levels in the crop root zone

For more details contact Growcom on 07 3620 3844.

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