

## Objective 2

Develop an affordable method to enable the production of farm scale maps of soil hydraulic characteristics for use by whole farm planners, irrigation designers and landholders.

### Methods

- Soil hydraulic properties may be estimated indirectly from other easily measurable soil properties such as soil physical and chemical properties if we can develop empirical correlation equations ( pedo transfer functions) to predict soil hydraulic properties from the easily measurable soil properties. A number of soil physical and chemical properties were measured along with soil hydraulic properties across 79 sites. Electromagnetic Induction (EM) survey was also carried on paddocks using an EM38 instrument across 29 sites during the second year (2003–04) of the Project. The purpose of the EM survey was to examine the potential for EM readings to predict soil hydraulic properties at paddock scale. (Attachment 1: Chapter 4)
- Detailed soil water retention characteristic was measured at matric suction of 0, 1, 5, 8, 10, 60, 80, 200 and 1500 kPa on 15 soil types.
- Correlation analysis of measured soil properties was carried out to determine which easily measurable soil properties were closely related to soil hydraulic properties. Multivariate and nonlinear regressions as well as artificial neural network analysis were carried out with those soil parameters which closely correlated to fit measured data of soil hydraulic property. (Attachment1: Chapters 9 and 11)

### Results

- EM data do not showed consistently strong correlation with saturated hydraulic conductivity of Horizon B1 or final infiltration rate. (Attachment 1: Chapter 9)
- Correlation analysis showed that no physical or chemical parameter was consistently correlated with saturated hydraulic conductivity or final infiltration rate of Horizon B1. Therefore, it was not possible to develop an indirect method for estimating saturated hydraulic conductivity or final infiltration rate from easily measurable soil physical and chemical properties. (Attachment 1: Chapter 9)
- Soil properties such as clay percentage and bulk density showed consistently strong correlation with soil water retention characteristic of Horizons A and B1.

Pedotransfer functions (PTFs) for estimating soil water retention of Horizons A and B1 were developed for soils of the SIR. The developed PTFs predicted well water content at different suctions from the easily measurable soil properties, such as particle size distribution and bulk density. (Attachment 1: Chapter 11)

## **Conclusions**

- Pedotransfer functions for predicting soil water retention characteristic from easily measurable soil properties were developed. However, consistent correlation between saturated hydraulic conductivity or final infiltration and easily measurable soil properties were not found.
- EM data collected from an EM38 instrument did not show consistent correlation with soil hydraulic properties.