Soil water workshops were undertaken in Western Australia during the 2005 winter season under the auspices of GRDC project CSA0009-Plant Available Water-for workshop delivery to growers. Excellent support for the project has been forthcoming from the Grower Group Alliance, the Local Farmer Group Network, CSIRO and Ag WA. These organisations have been active in sponsoring and supporting the workshops in the farming and consulting communities. Eight, one day workshops were conducted in the southern and central cropping regions with plans to extend coverage to other regions during 2006/07.

Workshops are generally of around 6 hour’s duration although the program is flexible to accommodate local interests. A participatory style of interaction is used which incorporates a combination of classroom discussion and activity supported by field experience with a range of monitoring tools. The decision was made in designing the workshops to ensure that the training material was relevant to both farmers and their consultants. Workshop topics include the soil water cycle, improving water capture and storage, soil water measurement and use of the information in crop management. This focus has resulted in a good mix of agricultural practitioners participating in the workshops with 64 farmers, 37 agribusiness consultants and resellers and 20 government staff attending.

Whilst it is too early to speculate on the longer term impacts of the training on agricultural production, short term impacts have been monitored through entry/exit surveys completed by most workshop participants. This document provides an overview of participant thinking on workshop content, impacts on their learning and planned future activity, as well as some comment on possible longer term impacts on production and sustainability. The completion of the surveys also provided valuable operational feedback to presenters on their own performance and areas requiring change.

Impacts on learning, skills development and proposed activity
The surveys indicate that prior to the workshops many were interested in increasing their understanding of the soil processes that underpinned crop production. This is reinforced by the comments made when asked what they hoped to gain from the workshop.

- Knowledge of factors effecting soil water holding capacity and how to increase soil water plant availability
- Knowing subsoil restraints & ways of overcoming them
- Discussions on finer points of using PAW for decision making in our environment
- Understand maximising soil water in conjunction with crop nutrition (N) requirements
- Better understanding of soil water management & some practical tools
- Better understanding of soil properties that influence water holding capacity & how to use this info. to make better decisions during the growing season

Participants agreed, pre-workshop, that there was value in knowing about stored soil water prior to sowing and its impact on yield potential, fertiliser requirements, crop
choice, sowing time and fallow management. Post-workshop evaluation indicated that there had been a slight divergence of views on the value of pre-sowing soil water and whilst all workshops still considered it important the level was reduced at some locations. Based on the data I would speculate that this likely relates to geographic location, with growers from areas of more reliable rainfall seeing pre-sowing stored soil water as being of lesser importance than those in the more marginal areas.

All workshops saw knowledge of soil storage capacity as being important, both pre and post workshop, with 53 participants (of a total of 63 who responded to this question) indicating that they would ‘significantly increase’ or ‘increase’ soil measurement activity during the following season. Another 9 indicated that they would maintain current levels of activity with no one indicating that they would reduce activity. In terms of the type of activity proposed, the use of rainfall and gut feel as indicators of stored water remained about the same (80 respondents), however the planned use of techniques such as probing and coring increased significantly with 44 respondents indicating that they would incorporate soil coring in their monitoring regime, compared to 12 pre-workshop. Most respondents indicated that they would not rely solely on one form of monitoring but would utilise a range of tools including rainfall, gut feel, coring and the use of decision support (DS) tools such as PYCAL and Yield prophet, although only 4 indicated current use of such DS tools.

Whilst the trend towards increasing sophistication in monitoring of soil water was common across workshops it was particularly strong with agri-business, indicating that they saw value in the information and techniques and were prepared to consider its use in their consultancies. In respect to return on investment by GRDC and other stakeholders, including agri-business in training activities provides an efficient means of extending new technologies to the agricultural community.

In terms of skills development 83% of respondents indicated that the training had increased their ability to correctly use the various monitoring tools, 92% had an increased understanding of soil characterisation and the skills necessary to do it (both in-field and calculation) and 82% felt confident that they could use the monitoring and characterisation skills and the information gained to better inform management decisions. Post-workshop confidence of individuals to actually interpret soil water analytical results varied across sites from 33 to 75%. 85% indicated that they wished to translate their new found knowledge and skills into information relevant to their farm or consultancy, with 74% expressing an interest in doing more with Yield prophet.

Post-workshop comments relating to future monitoring activity are as follows:

*Action to further knowledge re: water holding capacity:*
  - Find out mm holding of soil
  - Dig
  - Calculate rainfall water stored
  - Greater understanding of soil types
  - See if we can get a group together to find out PAWC
  - Buy a probe
  - Try and take crop lower limit
  - Calculations & monitoring
  - Read booklet for more detail to start
  - Soil characterisation with grower groups
  - Find available (localised) data
  - Look up past records, talk to growers, do own tests
  - Encourage people to take soil cores/attend CSIRO training course
- Try to determine DUL & lower limit
- Soil matters manual / yield prophet results
- Participate in group activities in this direction
- Look @ deep soil samples with more detail
- More cores/test sites, EM surveys
- Coring, looking at Ag. Dept. core results for our soil types

**Action to further knowledge re: plant available water:**
- Investigate yield prophet more, familiarise myself with PAWC
- Keep measuring next year as did this year - try to get deeper in profile
- Calculations & monitoring
- Profile some common soil types in area
- Review Ag WA data
- Measure it!
- Dig a few hole/cores throughout season
- Use worksheets in teaching program
- Probe / other group developments
- Don’t know
- Get DAWA people to check soil profile
- Assess constraints
- Deeper soil testing

**Workshop content**
The workshop ‘Monitoring and Managing Soil Water’ is accredited under the National Training Framework for Vocational Training at Certificate 5 level and includes training materials for both workshop participants and those wishing to facilitate such an activity. Workshop content for Western Australia has been developed from the original training program designed for use in the Northern Cropping Region, being modified to reflect WA cropping systems and climatic conditions. After 8 workshops in the west, content still continues to change as a result of new sources of information, local research and feedback from workshop participants on the relevance of particular components. It is expected that this will continue to occur and that content will continue to be ‘a work in progress’.

**Workshop feedback**
It is critical for continuing improvement of workshop content and delivery that feedback be sought from participants. Exit surveys are a good source of such information particularly in relation to the ‘localisation’ of information. Where possible it is also important that local experts be involved in workshop presentation. Not only does this provide increased credibility but also allows the ‘local knowledge’ to be incorporated into subsequent activities.

**How can workshop content be improved?**
- Localising information always helps, but that will be hard sometimes
- Have a southern farming consultant
- I think that SYN is a better tool for N decisions and PYCAL is probably more user friendly
- Pretty good now - the computer section could possibly go over case studies
- Make the database of specific info more available when it is compiled
- Only been in Aust. For 83 days! Will get back to you on that!
- By keeping up the good work! Using up to date data & disseminating new ideas/technology before workshop
- More real farmer experience on a few different soil types
- Very good already - Just provide more examples
- Nothing - great mix
Generally pretty good, more representation across soil types would be interesting, ie. high gravel %, non wetting.

More hands-on exercises during the computer session - perhaps follow thru over the season.

You did very well.

Work with groups to demonstrate the way it works.

Only a guide, while useful one part of the whole picture of profitability and sustainability.

Have samples of local soils, don’t worry about fallow info, dry seeding.

More field exercises.

More relevant detail for WA & its soils, maybe some pasture detail eg. soil types / rainfall records.

More WA “ground truthing” & data.

More data on our soils & constraints.

Only to be more aware of subsoil constraints in mallee areas.

When asked to respond to the question ‘Did you achieve what you expected today?’ all but 2 of 57 respondents indicated that they had achieved their aims.

**Did you achieve what you expected today?**

- Very impressed - liked interactive style
- Some useful info. But it isn’t going to be an exact science as all soils (and their structure) are different
- Increased knowledge
- Very good day
- Thankyou for the great work. It’s interesting to hear other state results
- Great presentation - my knowledge has definitely increased!
- Gained a much better understanding of soil type & interactions with soil water
- Very informative - well structured
- Very happy with the day, wasn’t sure what I would learn but easily understood the presentation
- Consolidated knowledge & helped formulate ideas about how to extend information at field days
- Gained information.
- I came to see how it was delivered - I saw!
- I came to see how farmers reacted - I saw!
- Would have liked to go into more detail on ‘on-farm/kitchen’ sampling protocol & calculations
- Can appreciate that the longer course would have been in more detail
- Excellent ground level introduction to the issues
- A good informative day
- It was good to work out drained up limit and bulk density
- As yield prophet achieves local results may become more confident

**Longer term impacts on production and sustainability**

Whilst it is dangerous to predict long-term change in practice based on a workshop survey, entry/exit evaluation does provide an indicator of what people are thinking at the time. Whether this thinking will be translated into longer term change remains to be seen and will be the subject of a longitudinal evaluation of project impact to be undertaken during the coming year (2006/07).

Over 90% of survey respondents ‘agreed’ or ‘strongly agreed’ that soil water workshops were a good investment of R&D funds, and contributed towards improved decision making. Over 70% of respondents indicated that the workshops helped to improve farm profitability and sustainability with 85% ‘agreeing’ or ‘strongly agreeing’ that soil coring and soil characterisation were valuable tools in improving the ability of individuals to assess water availability at critical times of the season.
The future
Workshops will continue to be run during 2006-07 and 2007-08 as part of GRDC project CSA0009. In the coming 12 months Western Australia will form a component of a national evaluation of the impact of this type of training on farm production and sustainability. This study will also include similar activities in the Northern Cropping Region undertaken by the GRDC Eastern Farming Systems Project.

Another aspect of CSA0009 is the collection and databasing of soil water data for use in simulation modelling and agronomic practice. To accomplish this goal it will be necessary to contact researchers around Australia to seek access to their data for inclusion in the database. This is already well under way in South Australia, Queensland and New South Wales and is expected to be extended to the others states during the coming year.