

Benchmarking as an extension tool: instant gratification versus 20:20 hindsight

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Abstract. Two distinct but complementary irrigation benchmarking programs have been developed by Primary Industries and Resources South Australia (PIRSA) and used by Department of Primary Industries Victoria (DPI) staff for irrigated horticulture in the Mallee. The first one allows participants to rate their performance against their peers and over time on a range of measures. Irrigation benchmarking was developed in 1998 - 2000. DPI has collected irrigation, yield, return and cost data annually for dried vine fruit, table grapes and almonds since 2002. A project officer entered the information into benchmarking software to produce a suite of water use efficiency indicators. Results were compiled in an annual report and provided to participants after completion of the irrigation season. The second benchmarking process utilises new irrigation management software called Irrigation Recording and Evaluation System (IRES) developed by the Irrigated Crop Management Service of Rural Solutions SA, for Primary Industries and Resources SA from 2004 to 2009. Although IRES was not specifically developed for benchmarking, irrigators record their irrigation records directly into the IRES software. Irrigators are able to produce irrigation efficiency indicators on demand to assess irrigation performance. Direct entry by irrigators allows instant feedback and adaptive management for the participant but no peer comparison. This process does set irrigation standards for participants to achieve but does not include the financial performance indicators required for whole-farm holistic benchmarking (Wilson et al 2004). The pros and cons of each benchmarking method, and using benchmarking as an extension tool, are discussed using case studies.

Introduction

Benchmarking can be a very powerful change agent for advancing on-farm change. There is little more powerful motivation than peer pressure, and benchmarking can provide plenty of that.

Benchmark is defined as a standard against which something can be assessed or measured. Modern benchmarking developed in the early 1960's as 'an activity-based analytical method having its roots in the US manufacturing industry' was adopted for agriculture (Ronan and Cleary, 2000).

In agriculture it is often not a standard but peer performance that individual participants measure themselves against. The Irrigation Benchmarking Project uses this approach. Irrigation benchmarking was adopted in the Victorian Mallee in 2001 for two reasons. The first was for the project manager to try and identify best irrigation practice management and technologies. The second was to provide feedback to the voluntary participants about their irrigation performance for ten different parameters (including combinations of yield, water applied, efficiency, irrigation system, scheduling method, cost of water and/or \$ returns). (For results see Table Grape Irrigation Benchmarking Seasons 2002-2008, Dried Vine Fruit Irrigation Benchmarking Seasons 2002-2008 and Almond Irrigation Benchmarking Seasons 2003-2008.) This process does not set standards but rather relies on comparative analysis (Cooper, 1995). This comparative analysis of performance supplies the peer pressure component of benchmarking. However there is no telling if peer performance meets best practice (Ronan and Cleary, 2000). Participants receive an annual report that they can use to monitor the impact of changes in their on-farm management in the long term and compare their performance to that of their peers in the same growing season.

True benchmarking provides a standard or pass mark that participants strive to meet. IRES combines crop evapotranspiration, rainfall and irrigation records to model crop water use and changes in soil water content in crop root zones for any planting patch. IRES provides irrigation benchmarks that participants can measure their performance against every time they irrigate. Deviations from the standard can then be used in a feedback loop to modify the very next irrigation. Yields, costs and returns can also be entered by irrigators at the end of the season to calculate a suite of water use efficiency indicators.

Providing a tool to irrigators is only part of the benchmarking process. It is essential that a process is provided that enables irrigators to pool their property results with other participants and property results. An initiative by the South Australian Murray Darling Basin Natural Resource Management Board (SAMDBNRMB) has enabled pooling of property results into district

summaries. This enabled irrigators to anonymously compare their performance against peers in key irrigation efficiency indicators. The individual property results were also combined to produce irrigation efficiency indicators of the irrigation district performance. The Land and Water Management Plan (LWMP) initiative by the SAMDBNRMB provided a framework for district scale indicators to be endorsed by a committee comprising of irrigators before broader circulation.

The advantage of this system is it potentially increases ownership by irrigators in the district scale indicators. The irrigators generate the databases used for establishing district summaries. Endorsement by a district committee can generate substantial expectation by peers on individuals to contribute to the district's irrigation performance. The property and district scale indicators have provided a method of tracking and reporting changes in irrigation efficiency over time, particularly as reduced water allocations have been imposed in the South Australian Lower Murray-Darling Basin.

The hands on interactive training workshops in the use of the IRES software have provided an excellent conduit for disseminating modern innovative irrigation information and technology, providing much broader benefits to irrigation management that complement the objective of district scale indicators.

As with most things it comes at a price. The LWMP and IRES style framework requires dedicated resources, suitable tools, adoption strategies and an enthusiastic motivated irrigation community. The LWMP and IRES style framework is unlikely to succeed or be sustainable without all four ingredients.

Results

For best results in using benchmarking as a change agent it has to be undertaken for a minimum of three to five years, and preferably longer. This allows participants time to evaluate the benefit (or not) of farm changes. One-off benchmarks don't allow time to assess if management changes result in improvements. Time and/or money spent on a solution will often result in the investor looking only for evidence that the investment has worked. For example, a grape grower upgrading an irrigation system in order to save water (costing \$50,000 to \$100,000) will make all sorts of excuses if the water savings don't eventuate, but rarely will they include mismanagement.

Participation

Voluntary participation in benchmarking is fraught with problems. If the data needed for participation is hard for the participants to collect the drop out rate will be high. Equally if the results are inaccurate the worth of participation is low and participation rates drop.

If the benchmarking is being undertaken to identify industry best practice and not all of the industry is participating, then the results may be skewed or misleading.

The irrigation benchmarking approach used by DPI has generated a lot of interest by industry, with many more reports being distributed than number of participants. Despite the interest it hasn't been easy recruiting participants or retaining them throughout the life of the project. Many people want to know what's going on in their industry but don't want to divulge their personal information. To counter this, irrigation benchmarking results are published with anonymous codes defining the participants where only the individual participant knows his or her code.

Some potential participants fear being 'judged' by their industry or the project staff, particularly if they don't 'score' well. One participant dropped out because he came 23rd out of 46 participants stating the process was flawed and he should be at the 'top'.

Annual benchmarking doesn't drive itself. It needs competent and enthusiastic staff to both sell and support it.

If data collection and analysis are agency driven, the accurate record keeping by the participants is not a high priority. For example irrigation benchmarking was carried out on irrigators in the south-east of South Australia to collect information for government. The participants had no ownership or interest in the project and it quickly faded away. The Mallee Irrigation Benchmarking Project has tried to overcome this pitfall by providing annual one-on-one and/or group feedback sessions on the results. The staff have previously and are currently getting feedback from the participants on what they get from participating and how the process can be improved in the future to maximise its relevance.

Where benchmarking was carried out with drivers and indicators of high relevance the process works. With low available allocation volumes due to drought and high water costs, the IRES approach, where the participants are self-motivated in their record keeping and analysis is

instant or on demand by the user and is more likely to be self-sustaining. In one case study in the Riverland of South Australia, 16 participants representing approximately 75% of the district irrigation area, have maintained their participation on a voluntary basis since 2003/04 irrigation season. Participants have provided IRES databases to compile district scale summaries of irrigation efficiency indicators. The participants receive two fold benefit from the process. Instant feedback on their irrigation management during the season, allowing changes to be undertaken prior to the next irrigation. The second benefit is comparison on key indicators relative to peers at the end of the irrigation season. Although the IRES implementation model was not a benchmarking project, it has provided benchmarking opportunities to participants. However, significant drivers are required to motivate participants to alter their management according to benchmarking processes. The experience indicates that benchmarking is more productive when it is part of a broader strategy to assist productivity rather than a focus predominantly on benchmarking. The provision of software tools, hands on training workshops with subsequent on-farm support have been key components to success.

Selecting indicators

Benchmarking provides an objective evidence based comparison for participants. However if the indicators used aren't relevant, benchmarking may not be a useful tool to promote on-farm change.

When considering using benchmarking as a driver for change, the question 'Do the drivers for change already exist or will they exist in the near future?' should underpin the selection of indicators. The drivers for change have to match the indicators for maximum effect. The ease of collection and accuracy of the data should also be considered in indicator selection.

For participants to use benchmarking as an information source to drive on-farm change, the indicators used must be relevant to them. For example yield (t/ha) or volume of water applied (ML/ha) (Figure 1) are age old indicators that are easily understood and recognised as performance indicators by grape growers. Drainage volumes on the other hand is rarely considered in farm management and therefore have not been used as a driver for change, even when extremely high volumes were calculated (Figure 2).

As can be seen in Figure 1 growers A, C and F applied almost twice as much water as growers B, D and E for the first two years of benchmarking. Upon reflection on their results growers A, C and F then made the decision to adopt improved scheduling equipment to improve their irrigation management. It took two years for each of them to sufficiently trust their new equipment to improve their water use efficiency.

Figure 2 shows the amount of calculated drainage as a percentage of water applied. Growers A and C did reduce their drainage as a consequence of using less water after they adopted irrigation scheduling (see above). Grower D, who is already one of the lower water users, altered his practices, when he found out how much water he had wasted by over-irrigating early in the season of the first year. It is common best practice that growers apply a 10-15% leaching fraction to flush out accumulating salts applied with the irrigation water. Grower D became so efficient in years two to four that he may have had salt building up in his root zone and therefore was encouraged to apply leaching irrigations in years five and six. Grower E, another low water user, found out in year one that he was not applying a leaching fraction and changed his management accordingly for the subsequent seasons. Grower G did not care about his drainage volumes. The area has sub-surface tile drainage and he could not see the problem. In fact in year four almost half the water he applied was lost to drainage. His driver for change was the drought driven reduced water allocation, when he received 45% of his usual allocation and additional water cost upwards of \$1000/ML.

The Irrigation Benchmarking Officer was able to use the water use figures for growers A, C and F to show them that their peers were more efficient. This caused them to review their performance and adopt new management to improve. The Project Officer was able to get growers D and E who had already compared very well in the water use criteria to examine their water efficiency in more detail to get small improvements.

Figure 1. Grape growers water use for the irrigation seasons 2002/03 to 2007/08.

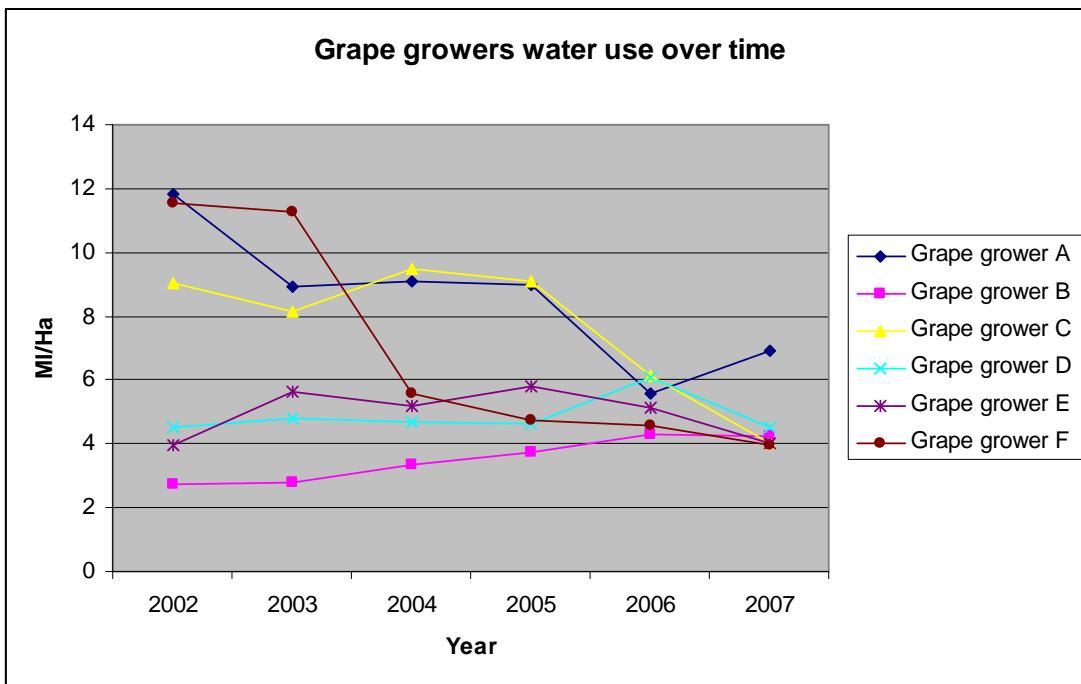
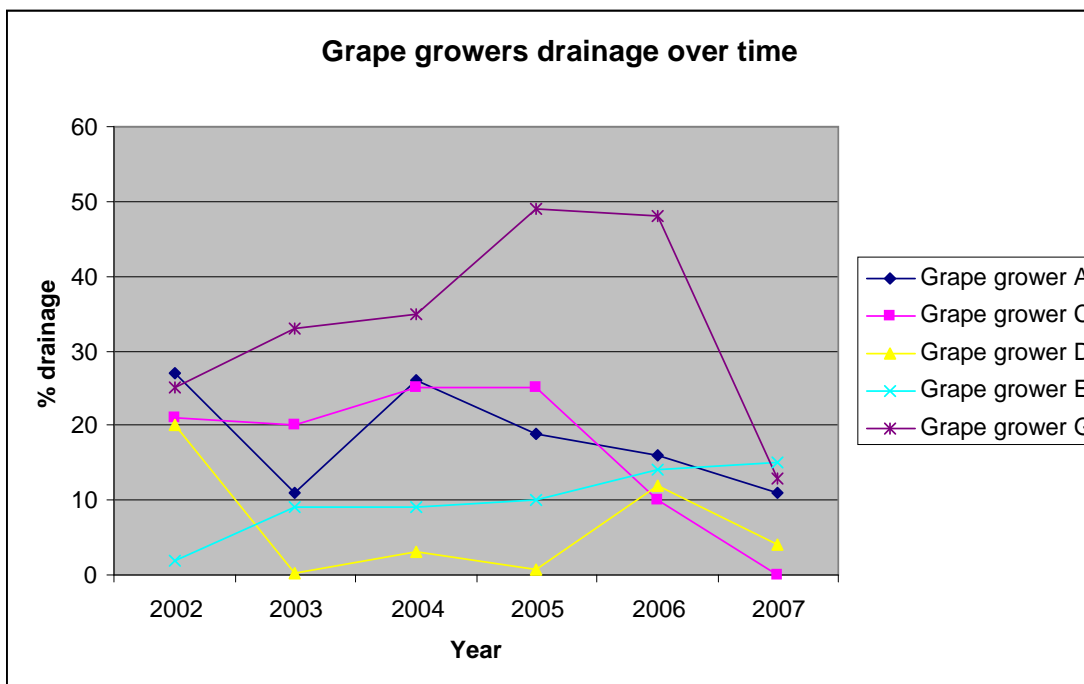


Figure 2. Grape growers calculated drainage percentages for the seasons 2002/03 to 2007/08



Grower G did not relate to the drainage figures, so they weren't a relevant driver for him to change practice. It was only circumstances that caused him to change.

In contrast when the driver for change is large (e.g. reduced water allocation coupled with a high cost to buy water) even those grape growers with small drainage volumes in the early years of the project used the results to determine how much improvement they could still make.

Drought has severely impacted on irrigation allocations in recent years in the lower Murray Valley. A secondary serendipitous benefit of this benchmarking project is that it has allowed a

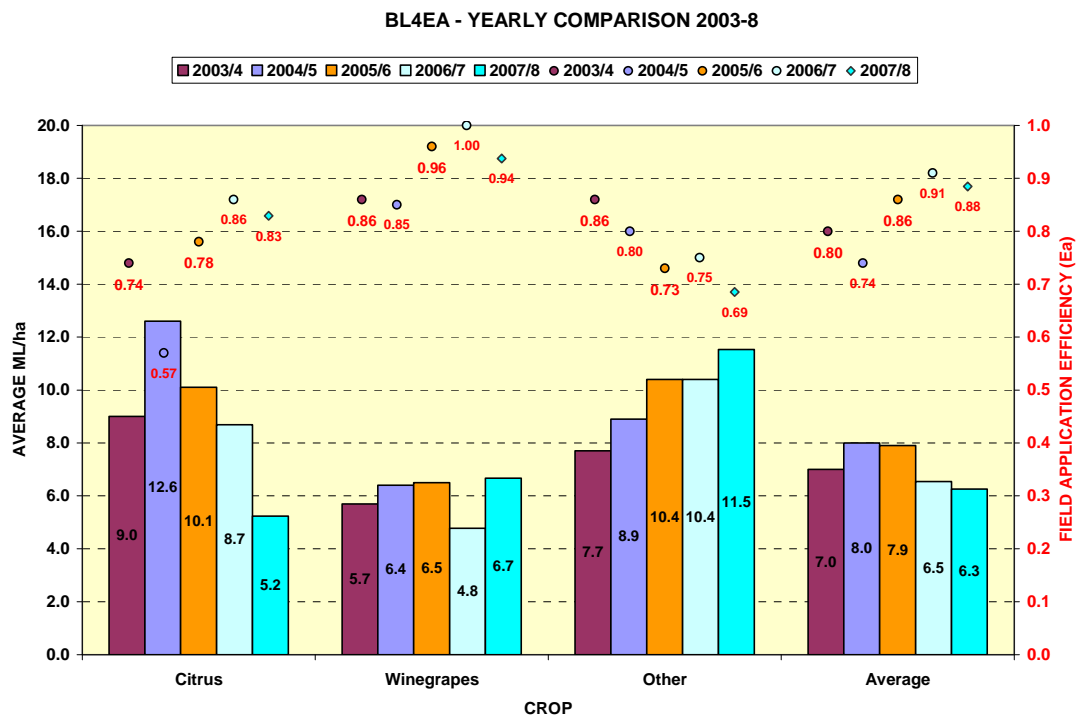
robust monitoring tool to monitor the impact of reduced allocations on productivity as well as identify on-farm management strategies that minimised the adverse impacts.

The annual review of results by the participants may be either a bonus or a negative, depending on the current drivers for change and the timing of release.

If the driver for change is small (e.g. a small increase in profit for each unit of improvement) it may take a large accumulative anomaly in an indicator to engender thought of change. For example, an irrigator who uses 0.2ML excess each irrigation may not be driven to change if the information is presented per irrigation. The gain doesn't seem worth the pain. However, over the irrigation season (20-30 irrigations) this equates to 4-6 ML wasted, a much bigger spur to change.

Annual presentation of results does not allow an instant response during that season. In fact, if the mistake in management is made early in the season and the report isn't ready at the start of the next season the participant may not be able to improve practice until the following season. It has been common for grape growers in the Mallee to over-irrigate early in the season (see Figure 3). If this is pointed out to the growers after the start of the next season they will have already used their original management of over-watering and won't be able to change until the following season.

Figure 3. Average megalitres per hectare applied per season for various crop categories in an Irrigation District in the Riverland of South Australia.

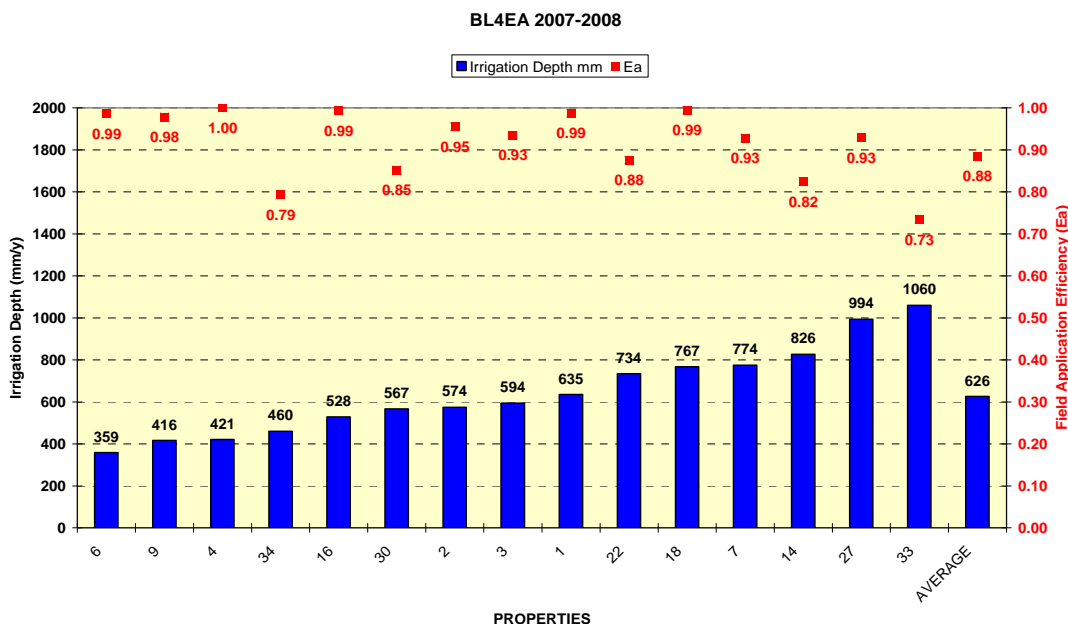


The intent of the IRES model was to provide a tool to assist irrigation management that also supported comparison with peers and irrigation performance reporting at property and district scales. An example of irrigation efficiency indicators produced for one district over time is shown in Figure 3.

Participants are able to compare their own property performance against peers for a specific season (Figure 4).

An unexpected outcome of the project has been the extensive interest and use of the software tool and comparative process to assist water budgeting under reduced irrigation allocations associated with drought conditions. Irrigation depth in millimetres or megalitres per hectare have proven to be key indicators in assisting irrigators develop water budgets and monitor consumption relative to budgets for specific plantings and for the entire property.

Figure 4. Average depth applied (mm) for BL4EA district participants for the 2007/08 irrigation season.



Conclusion

The two benchmarking approaches described above have provided feedback loops for the participants to learn from and modify their on-farm management. They have also provided independent monitoring of on-farm change, providing the participants feedback on how well the change worked.

They have worked well, predominantly because strong drivers for change developed during the benchmarking, in our case reduced water allocations due to drought, and enthusiastic staff were available to support the participants. The use of indicators that the participants related to was vital for the participants understanding and using the benchmarking results.

If the drivers for change are small, annual accumulative results may be enough to engender change. If the drivers are large enough, the instant feedback loop offered by IRES is of greater benefit to the participants.

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