Turfing out a salty problem

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Many towns in salt-affected regional areas suffer from high and saline water tables. These towns also face increasingly high water bills to irrigate recreational turf areas. Searching for solutions that address both challenges is a research project based at Wagin, Western Australia.

Initially, production bores were installed in Wagin as part of the *Rural Towns — Liquid Assets* project to lower water tables, control salinity, and produce a new water supply.

The *Rural Towns — Liquid Assets* project, led by Department of Agriculture and Food Western Australia (DAFWA), is a partnership between the Wagin Shire, CSIRO, CRC LEME, WA Chemistry Centre and The University of Western Australia (UWA). The project's work in and around Wagin is also supported by the South West Catchments Council.

Salty solutions

The water pumped out of Wagin's bores is about one quarter the salinity of seawater (about 1300 mS/m). When dewatering started it was pumped out to a nearby salt lake for evaporation. It seemed a waste, especially given while saline water was being pumped out of town, scheme water was being pumped in to irrigate sportsgrounds, parks and gardens.

Mark Pridham, from DAFWA, said that because shires were forced to use scheme water to irrigate sportsgrounds when locally sourced water ran short, some small rural towns were facing colossal water bills.

"Over the years, the drying trend has meant rural communities rely more on scheme water because their local surface water supplies have become less dependable. However, as the price of water and the length of the irrigation season have increased during the past decade or so, using scheme water for irrigating the town oval has become too expensive," Mark said.

Towns faced the choice of paying big water bills or finding alternative water supplies, such as increasing local dam catchment efficiency, re-cycling waste water or stormwater, or utilising groundwater.

ABOVE: Turf research plots Wagin (Photos: M Pridham)

INSET: PhD student Ghazi Abu Rumman uses an EM38 device to measure soil salinity in the turf plots.

RIGHT: Turf plots irrigated with saline groundwater at Wagin. (Photos: M Pridham)

Salt-tolerant species the answer

As part of a joint project between UWA School of Plant Biology and *Rural Towns — Liquid Assets*, trials started in Wagin during November 2006 to determine whether salt-tolerant turf species could be grown using the saline groundwater for summer irrigation.

"This is our second summer of research, although it is our first full summer of data as we had problems with locusts during the end of 2006, soon after the plots were planted," UWA plant physiologist and FFI CRC researcher Dr Tim Colmer said.

Four species are being evaluated in the trial — kikuyu (*Pennisetum clandestinum*); saltwater couch or seashore paspalum (*Paspalum vaginatum*); saltgrass (*Distichlis spicata*); and marine couch grass (*Sporobolus virginicus*). The last three species are halophytes — plants that naturally grow in saline habitats, such as on the shores of salt lakes or in salt marshes.

"Kikuyu is currently used on the ovals in Wagin but it is neither salt nor drought tolerant," Dr Colmer said.

key points

- Rural towns suffering from high water tables may have an innovation solution in the future
- Saline groundwater could replace scheme water to irrigate local sportsgrounds and parks if suitable salt-tolerant turf species are identified
- Research outcomes from this project may have implications for broadscale agricultural systems.

In the trial, the kikuyu was severely damaged by the saline irrigation. All three halophytes performed well, although they differ in several characteristics, such as leaf size, colour and growth rates. Marine couch grass is very slow-growing, so the turf would require less mowing but would take longer to establish and be slower to recover from wear. Therefore, it seems the seashore paspalum and saltgrass would be the more likely to be suitable for broader-scale use in the future.

Keeping an eye on accumulation

The trials have also looked at salt accumulation in the root zone.

"In terms of the halophytes and the saline water used at Wagin, the salt accumulation is okay — the grasses can handle it. But when it rains, the store of salt will leach," Dr Colmer said.

"We need to be careful about off-site impacts. Our trial site is contained by gravel bunds and any water collected in a sump is also disposed into the drainage system leading to the nearby salt lakes.

"In areas where there is already so much salt in the groundwater, and if you are only using a proportion of the total water for irrigation, then the amount of salt that flushes back into the groundwater system should not have wider impacts. But we need to look at the levels of salt accumulation and leaching to be able to calculate the overall salt balances to know this for sure. That will be one of the many knowledge outputs from the trials."

Mark said the effectiveness of using the saline groundwater for irrigation depended on the turf species used, well designed sub-soil drains, watering heavily but infrequently, and watering at times when evaporation is at its lowest, such as very early in the morning.

"If we get the combination of these factors right, it can work well. If we get it wrong, a salt scald could appear on an oval pretty quickly," Mark said.

The amount of water currently being diverted to the irrigation trials is only a small proportion of that pumped out from the town, with the rest still going to a salt lake for evaporation. During winter, when irrigation is not required for turf, all the pumped water goes to the salt lakes.

Broader applications

Dr Colmer believes this research may have implications for the broader landscape, with applications to sustainable grazing on saltland. Saltland grazing systems are already in place on many farms in WA and have been shown to use some of the saline groundwater. Issues of salt accumulation in the root zone are of interest for these sites.

"Saline groundwater irrigation could possibly be used on broadscale forage areas, however, the value of the product would be unlikely to justify the infrastructure required. In the amenity and recreation applications, the end use justifies the infrastructure."

"What we have now, is proof of the concept. Where we go from here will be the focus of our discussions later during 2008."

It seems likely that, if the final results from Wagin are as positive as anticipated, there will be a queue of rural shires lining up to see if saline groundwater and halophytic turf can help lower their water bills and provide good recreation areas.

More information

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