

Case study: Re-use of irrigation drainage water



Above – the date palms after pruning ready for irrigation. Image: D Reilly

Background

Saline irrigation drainage water is normally a waste product and releasing it directly back into the environment can have negative environmental impacts. The date palm (*Phoenix dactylifera*) has the ability to tolerate high salinity levels and extended dry periods. A project was established to investigate the use of saline irrigation drainage water to irrigating date palms to grow a date fruit crop.

The project measured a number of water and crop response indicators over a six-month period from November 2014. A detailed report is available that summarises the data collected and fills knowledge gaps in the application of drainage water to date palms to demonstrate 'proof of concept'.

The method

A small existing planting of five date palms was pruned back in 2013 in preparation for commercial production. In October 2014, a water meter and sprinklers were installed to measure and deliver the re-used water on the date palms.

Detailed measurements and observations were recorded over a six-month period including drainage water analysis, nematode testing, leaf tissue testing, microbiology and soil sampling, and fruit assessment.

Date palm crop yield was measured to investigate the economic returns to the grower. Fruit from the trial site was harvested 18 June 2015.

The results

A total of 675 kilolitres (KI) of drainage water was applied to the date palms between November 2014 and June 2015. This translates to approximately 135 KI per palm and meets the recommended requirements for fruiting palms.

The salinity of the irrigation drainage water was relatively low at 2140-2250 EC units. This is consistent with water quality from the Loxton drainage scheme which averages 2178 EC units. International scientific research reports that date palms are highly suited to perform under these conditions and there is no yield loss where water quality is less than 4,000 EC units. At 10,000 EC units a 25% yield loss can be expected.

Nematodes can be problematic to date palms. Soil and water sampling did not uncover any nematodes in the water sample. Root knot and stunt nematodes were found in the soil sample but at low levels. Where water and nutrients are limited, root knot nematodes can cause plant damage but stunt nematodes are unlikely to cause damage.

Early leaf tissue monitoring revealed some nutrient deficiencies – mainly calcium, zinc, iron, magnesium and manganese. Fertiliser was applied during February and a subsequent leaf test in June showed some improvement. It is assumed that nutritional deficiencies affected the performance of the date palms with reduced fruit yield.

The two female palms produced five fruit bunches yielding 58.5 and 44kg. In comparison, commercial date growers would aim for around 90kg per palm from 10-12 fruit bunches. The female palms in this study originated from seed whereas selected elite cultivars are used to establish commercial plantings. With time and management it is expected production would increase.



Fruit quality was assessed against commercial fruit quality and was found to be similar although calcium levels were low. In general, the growing conditions and reuse of irrigation drainage water were favourable for date fruit production.

Conclusion

Project results indicate that re-using saline irrigation water for date palm fruit production is a viable management option.

In a fully commercial plantation, elite cultivars would be selected with a male to female palm ratio of 1:15 to give the production required for a profitable enterprise.

Recommendations

Each irrigation district serviced by drainage schemes would benefit from assessments in re-use capability. Installing data loggers that measure discharge volumes and salinity can do this. At the farm level an inexpensive flow meter can provide valuable data for on-farm irrigation management.

The potential to re-use saline irrigation drainage water could be expanded to include other saline tolerant crops and a comprehensive list needs to be compiled.

Natural Resources SAMDB Land and Water Management Team Coordinator, Tony Randall said 'These palms had not been used or managed for production for a number of years, with no irrigation application. Within six months and with the application of irrigation drainage water, a waste product of sorts, the palms were producing commercial quality dates that tasted delicious. This project highlights some of the opportunities that water re-use can present to producers and communities across the Murray-Darling basin'.



Above – One of the female palms in fruit. The fruit are covered in protective bags to prevent bird and insect damage.
Image: D Reilly



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Location: Riverland

Project: Investigation of the potential commercial viability of using saline irrigation drainage water to grow fruiting date palms.

Project partners: Loxton to Bookpurnong Local Action Planning Committee managed this trial. Gurra Downs Date palms undertook date palm management and date production and soil and water testing.

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