



# Irrigating sub clover with saline groundwater

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## in a nutshell

- Two experiments undertaken at Deniliquin examined the effect of irrigating with saline groundwater on the production of sub clover
- All plots were clover dominant – the production was not influenced by ryegrass or other weeds
- Irrigating with saline groundwater substantially reduced autumn production of sub clover
- Spring production was relatively unaffected especially if there was sufficient winter rainfall to leach applied salt below the root zone

***Growers who have access to groundwater (either shallow spear points or deep bores) or saline drainage water may wish to use this supply to irrigate sub clover. It is generally considered that water with a salinity level less than 0.8 dS/m (800 EC units; 500 ppm) can be used to irrigate sub clover without any loss in productivity. However, water supplies often are more saline than this.***

What is possible?

## Experiments at Deniliquin

### A first look

A pasture phase was a component of a rotation experiment at the Murray Valley Field Station, which included rice as a leaching crop. Sub clover (Trikkala) was undersown in a wheat crop. In the following autumn the clover was established (germinated) and irrigated in the autumn and spring with saline groundwater at either 2 or 3 dS/m (approximately 1300 and 1900 ppm respectively). A third treatment was irrigated with non-saline channel water (0.15 dS/m).

Irrigating with groundwater reduced the autumn production. When groundwater was used to germinate the clover, seedling numbers were only about 50% of the number that germinated in the treatment where channel water was applied. Subsequent growth in the autumn was also reduced. Presumably this was a result of reduced seedling numbers and/or the effect of further irrigations with saline groundwater.

There was no effect of water source on winter production, as there were no irrigations applied during winter – growth was in response to rainfall.

The rotation experiment was conducted over a period of 10 years. The experimental design provided several

opportunities to study the effect of irrigating with saline groundwater on sub clover production.

Winter production, in response to rainfall, was not influenced by the autumn treatments.

There was some reduction in spring production, especially in one season where there was virtually no winter rainfall to provide any leaching of the applied salt from the root zone.

### A more detailed look

A subsequent experiment evaluated the establishment and autumn production of sub clover (Trikkala) when subjected to nine different combinations of either channel supply or saline groundwater (3 dS/m).

There were four replications. The sub clover was established in the autumn of 1995. During the spring, five of the treatments were irrigated twice with channel water and the other four received two irrigations with groundwater. The plots were not cut or grazed in this establishment year as the aim was to encourage maximum seed set.

In the autumn of 1996 the germination irrigation used either channel or groundwater. The three subsequent irrigations included various combinations of channel or groundwater (Table 1).

### Effect on production

Irrigating with groundwater during the autumn reduced production by 40% (Table 1). When the germinating irrigation was with groundwater followed by an irrigation with channel water, production was reduced by 20%.

Those plots that were irrigated with groundwater in the preceding spring produced 11% less than those irrigated with channel water. Although not measured, the reduced production was probably as a result of lower seedling



numbers. Irrigating with saline groundwater in the spring most likely produced a lower seed set which led to fewer seeds being available to germinate in the following autumn.

June to October rainfall totalled 187 mm, sufficient to leach some of the applied salt from the root zone. The first spring irrigation was not required until 17 October with a second irrigation on 5 November. Treatments ranged from both irrigations with channel water to both irrigations with groundwater. There was no effect of groundwater on spring production.

### Conclusion

Irrigating sub clover with saline groundwater (2–3 dS/m) reduced production especially in the autumn. Spring

production was less affected, although if there is insufficient winter rainfall to leach applied salt from the root zone spring production may also be reduced. ☀️

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### Further information

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**Table 1: Time and source of irrigation water for key treatments; production to 12 May (t/ha). The germinating irrigation was on 14 March. (CW = channel water (0.15 dS/m); GW = groundwater (3 dS/m))**

Treatments	14 March	25 March	10 April	3 May	Production	Difference from control
1 and 2	CW	CW	CW	CW	4.24	(control)
5 and 8	<b>GW</b>	CW	CW	<b>GW</b>	3.45	↓ 20%
4 and 9	<b>GW</b>	<b>GW</b>	<b>GW</b>	<b>GW</b>	2.65	↓ 40%
lsd P = 0.05					1.05	