Effect of drought on subsequent pasture growth

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The response of plants to water stress after the stress is relieved has received little attention. A pasture experiment at Orange provided the opportunity to monitor pasture growth during and after the recent drought (1981-83) on dryland and irrigated plots. Major effects were recorded on the droughted plots after the drought ended.

Methods

The experiment was sown in 1981 to determine the seasonal growth curves of *Phalaris aquatica* cv. Sirosa, *Lolium perenne* cv. Victorian, *Dactylis glomerate* cv. Currie, *Festuca arundinacea* cv. Demeter, *Trifolium subterraneum* cv. Woogenellup and *T. repens cv.* Huia in swards under dryland and irrigation.

All plots received 25 kg P and 75 kg K ha twice a year and the grass plots 35 kg N ha^{-1} every 6 weeks when cut. From April to October 1983 plots were not irrigated as rainfall was adequate.

Results and Discussion

During 1981 and 1982 pasture growth of all species under irrigation exceeded that of dryland plots, but after the drought ended in April 1983 mean yields from dryland plots of the grasses, over the following seven months, significantly exceeded (P<.01) that of previously irrigated plots by 50 to 120 percent.

Table 1. Dry matter yields (t ha^{-1}) from Nay to November 1983

Species	Dryland	Irrigated	Sig(P<.05)	D/I
Phalaris	9.34	6.37	*	1.54
Lolium	11.65	5.30	*	2.21
Dactylis	8.12	5.36	NS	1.57
Festuca	9.80	5.67	*	1.74
T. subterraneum	6.28	4.66	NS	1.39
T. repens	4.05	5.29	*	0.69
SE of means	1.02			0.15

The lower dryland yields from white clover were due to a dry period from October 1983.

The increased yields from dryland grass plots had no immediate explanation but several possibilities were considered:

- Residual leaf area may have been greater below cutting heights on dryland plots, but this effect would only remain for one cutting cycle.
- Plants may have flowered in response to rain but this was not observed.
- Tillering may have been greater on dryland plants as there was no self shading but tiller counts in October 1983 showed many fewer tillers per unit area on dryland plots.
- Pests and diseases may have been greater in irrigated plots but no observations supported this.
- Root growth may have been greater on dryland plots as roots grew further into the soil to the deeper moist layers. A greater root mass can stimulate top growth and also would exploit a greater soil volume for nutrient uptake.
- Mineralisation during the drought may have increased the supply of nutrients. Plant samples taken in October 1983 showed 50% greater N% and N content, but not P, in green leaves of dryland grass plants compared with irrigated.

It was concluded that possibly soil mineralisation and maybe increased root growth in dryland grass plots during the drought resulted in the large increase in pasture growth recorded after the drought.