



University of Kentucky
UKnowledge

International Grassland Congress Proceedings

XXI International Grassland Congress / VIII
International Rangeland Congress

Annual Pasture Legumes for Increased Productivity of Aaline Soils in South-Western Australia

P. G. H. Nichols

Department of Agriculture and Food, Australia

D. R. McClements

Department of Agriculture and Food, Australia

T. O. Albertsen

University of Western Australia, Australia

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/21/13-1/8>

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

Annual pasture legumes for increased productivity of saline soils in south-western Australia

P.G.H. Nichols^{A,B,C,E}, D.R. McClements^{A,B} and T.O. Albertsen^{B,D}

^A Department of Agriculture and Food Western Australia, Locked Bag 4, Bentley Delivery Centre, WA 6983, Australia.

^B Future Farm Industries CRC, The University of Western Australia, Crawley, WA 6009, Australia.

^C School of Plant Biology, The University of Western Australia, Crawley WA 6009, Australia.

^D Department of Agriculture and Food Western Australia, Katanning, WA 6317, Australia.

^E Corresponding author: E-mail: pnichols@agric.wa.gov.au

Key words : salinity ,waterlogging ,varieties ,biomass

Introduction Annual pasture legumes can increase the productivity of mildly to moderately saline land , but there is little data comparing their relative performance across sites with different combinations of salinity and waterlogging . Trials were sown in south-western Australia to obtain such information .

Materials and methods Spring biomass was measured over a three year period of 33 self-regenerating annual legumes in small plots (5 replicates) at three sites (Tammin ,Duranillin and Cranbrook) differing in rainfall , surface salinity and waterlogging (Table 1) . Further trial details are given in Nichols *et al.* (2008) .

Table 1 Experimental site details , including soil properties to 10 cm depth .

Site	Mean annual rainfall (mm)	pH (CaCl ₂)	EC _e (dS/m)		Winter waterlogging	Soil texture	Year sown	Plot size
			Winter	Summer				
Tammin	330	6.5	2.4	10.9	Minimal	Clay sandy loam	2003	2 m × 1 m
Duranillin	530	5.6	5.0	30.8	Extensive	Sandy loam	2003	2 m × 1 m
Cranbrook	530	5.5	3.2	8.0	Occasional	Sandy clay loam	2004	5 m × 2 m

Results and discussion Spring biomass of selected species is shown in Table 2 . Most legumes , particularly *Trifolium michelianum* and *T. resupinatum* , were productive at Cranbrook , the most favourable site for plant growth . *Medicago polymorpha* was the most productive species at the low rainfall , non-waterlogged site of Tammin . No commercial species persisted at Duranillin , a site with dual stresses of high salinity and waterlogging . *Melilotus siculus* has the potential to fulfil this role , provided an appropriate *Rhizobium* strain can be selected . Further trial results are given in Nichols *et al.* (2008) .

Table 2 Spring biomass (kg/ha) each year of selected annual pasture legumes at 3 sites . ($P < 0.001$)

Species	Variety	Tammin			Duranillin			Cranbrook	
		2003	2004	2005	2003	2004	2005	2004	2005
<i>Medicago polymorpha</i>	Scimitar	741	2491	2369	606	10	0	4101	5549
<i>Melilotus siculus</i>	Bulk of 3 genotypes	417	0	0	1912	810	739	1661	2119
<i>Trifolium michelianum</i>	Frontier	818	402	434	943	10	0	5010	7683
<i>Trifolium resupinatum</i>	Prolific	857	57	0	1438	50	0	3882	6414
<i>Trifolium subterraneum</i>	Trikkala	218	13	0	94	0	0	554	2750
Least significant difference		381	539	484	791	42	-	1164	1992

Reference

Nichols , P.G.H. , Craig , A.D. , Rogers , M.E. *et al.* 2008 . Production and persistence of annual legumes at five saline sites in southern Australia . *Aust. J. Exp. Agric.* , 48(3) (in press) .