CONTROL OF RUSHES (*JUNCUS* spp.) IN IRRIGATED PASTURES

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Rushes (*Juncus* spp.) are particularly troublesome in irrigated pastures, especially those based on white clover and irrigated in summer. Chemical control of rushes is possible but expensive, and tends to be less effective on mature plants. Furthermore, the margin between the dose rate required to control the weed and that which will damage the pasture legume is narrow. This paper reports results from a field experiment in which rush control was achieved without recourse to chemicals.

An experiment involving both annual and perennial pasture species was laid down at Deniliquin, New South Wales, in May 1958. For the annual pasture the species sown were Wimmera ryegrass and subterranean clover and for the perennial pasture, perennial ryegrass and white clover. The soil was a red brown earth (Purdinima sandy loam) which had received a basal dressing of 550 lb per acre (616 kg per hectare) superphosphate immediately prior to sowing. Biennial maintenance dressings of 550 lb per acre (616 kg per hectare) of superphosphate were also applied. The plot size was 33 ft x 44 ft (10m x 13m) and there were four replicates. The proportion of grass and clover and the level of nitrogen fertilizer were the main variables. Thus there were four combinations of grass and clover ranging from 100% grass by 25% decrements to 100% clover. The pure grass stands received nitrogenous fertilizer at four levels, N-0, N-125, N-250, N-500 lb per acre (0, 140, 308, 616 kg per hectare).

Management of the experiment involved flood irrigation during the growing season fo each pasture type to ensure maximum production. The area was intermittently crash grazed by sheep.

In July 1963 the number of rush clumps in each plot was noted. Logarithmic transforms were used in the analysis of variance, the results of which are summarized in Table 1. The density of rushes was much lower in annual pastures, irrespective of clover content, but in the perennial pasture there was an inverse relationship between the clover content and the number of rush clumps. The pure grass swards which had received high levels of nitrogenous fertilizer were virtually free of the weed. Dry weights of rush in each plot were also determined. There was a 30-fold difference in yield of rushes between the pure grass and the pure clover. The weight of individual clumps showed a similar decline (range 9.8-1.5 g per clump) as the clover content went from 100% to zero.

TABLE 1

Rush Density as Influenced by Companion Pasture Species

Pasture	No. of clumps per acre			
	Perennial		Annual	
	Log transform	Actual	Log transform	Actual
100% clover	3.572	3730	2.320	210
75% clover	3.546	3520	2.226	170
50% clover	3.207	1610	2.341	220
25% clover	3.066	1160	2.255	180
100% grass	2.938	870	1.631	40
100% grass + N-125	2.183	150	1.150	10
100% grass + N-250	2.021	100	Nil	Nil
100% grass + N-500	1.301	20	Nil	Nil
L.S.D.				
P = 0.05	0.688			
P = 0.01	0.923			

The results show that the density of rushes is related to the nitrogen application and to the competitive ability of the sown species. Wimmera ryegrass and subterranean clover, because of their shorter growing season, receive less irrigation water and clearly this limits the danger of incursions by *Juncus* spp.; but, even so, *Juncus* densities were lowest in pure grass stands where nitrogenous fertilizer was applied. In perennial pastures the rush densities were so great in the pastures with a high clover content (>75%) as to render some chemical control imperative. By contrast, grass swards treated with nitrogenous fertilizer were virtually free from this weed.

The increasing interest in the use of high analysis nitrogen fertilizer and the rising costs associated with chemical control suggest that more attention could be paid to fertilizer management as a tool to control rushes in irrigated pastures.