

Dynamic change of production and botanical composition in *Trifolium repens* and perennial grass mixtures over 20 years in the Karst region , Southwest China

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White clover (*Trifolium repens*) use is valued for its ability to substitute for fertilizer nitrogen (N) use and to improve pasture quality (Thomson 1984) . It was introduced into the Karst region of China at least 100 years ago ; however , its persistence and compatibility with grasses in the mixture still remains unclear .

An experiment was conducted at Zhuopu Demonstration Farm , Guizhou Province , China (104°07' 25"E 27°12' 30"N , 2442 m a . s . l) , from April 1985 to November 2005 . Four mixtures consisted of white clover plus perennial ryegrass (*Lolium perenne*) (T+L) , red fescue (*Festuca rubra* L .) (T+F) , Kentucky bluegrass (*Poa pratensis* L .) (T+P) and bromegrass (*Bromus inermis* Leyss) (T+B) , grazed with Corriedale sheep between pasture mass of 1800~2500 kg DM ha⁻¹ and 900~1200 kg DM ha⁻¹ . With N , P and K fertilizer applied in the first four years then yearly application of P fertiliser only .

Results have shown that T+F had the highest mean annual net production and remained stable over 20 years , followed by T+L and T+P , while T+B was the lowest . However , T+L was significantly higher in net yield in the first four years . White clover produced similar yields and was a similar proportional of the sward composition in all mixtures , whereas the four grasses differed greatly ($P < 0.01$) , indicating that selection of companion grasses is essential for the production and persistence of binary mixtures (Figure 1) .

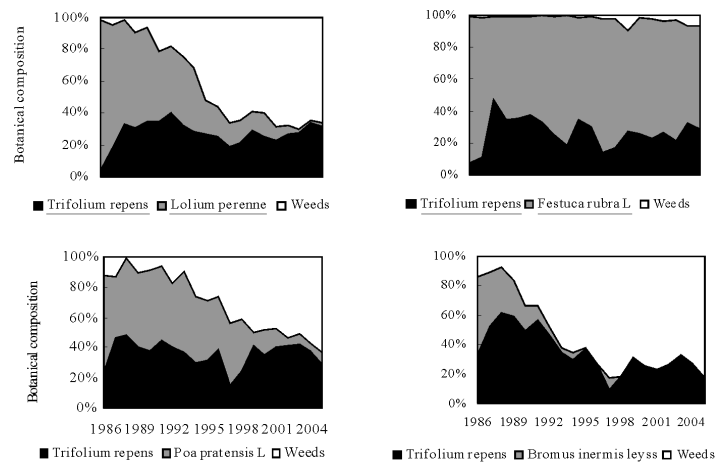


Figure 1 Botanical composition for each treatment from 1986 to 2005 .

Species of companion grasses had no significant effects on white clover production and persistence , but strongly affected total net yields of the mixtures . These findings are different from many studies , which have found that sheep grazing generally results in a decrease in white clover content (Hodgson 1990 ; Sheath & Clark 1996) , and the companion grass species compete and affect the persistence of the clover (Nolan et al . , 2001) .

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