

Germination response of different species to allelopathy on rangeland plants

Mei TIAN , FuJiang HOU

College of Pastoral Agriculture Science and Technology , Lanzhou University , Lanzhou Gansu 730020 China .E-mail : cyhoufj@lzu.edu.cn

Key words : allelopathy , rangeland , herbage residue , aqueous leachate , germination , native species

Introduction Allelopathy is defined as any directly or indirectly beneficial or detrimental effect by one plant on another through production of chemical compounds that are released into their environment (Rice , 1984) . Allelopathy helps to elucidate the phenomena such as the composition and distribution of plants . The research in this area on rangeland is very scarce . The objective of this research was to assess the allelopathy through the germination response of different species to the aqueous leachate from residues of dominant rangeland plants .

Materials and methods Residues of *Stipabungeana* Trin , *Lespedeza davurica*(Laxm .) Schindl , and *Artemisacapillaris* Thunb were collected during July 2006 , air-dried and used as donor plants prepared for the aqueous leachate . Native species seeds of . *L . davurica* , *A . capillaris* , and *Potentillabifurca* were receptor plants . All materials were from an agriculture and pasturage interlaced zone of Huanxian in the northern part of China . Three treatments were imposed with three replicates . The solutions were bioassayed at different concentrations (2 .5% , 5% , 10%) . Seeds of each species were germinated in Petri dishes and moistened with different concentrations . By using seed germination rate , germination speed and RI , we assessed their allelopathic potential . All data were analyzed with SPSS 13 .0 .

Results Aqueous leachate from residue of dominant species showed a significant inhibition of germination rate (Figure 1) and delay in germination speed (Figure 2) . When watered with each concentration of solutions , the allelopathy of Bunge Needlegrass was weaker compared with other two plants' aqueous leachate (Figure 3) . The results provide evidence for potential allelopathic inhibition by the three dominant species on their associated species by delaying or totally inhibiting germination depending on the concentration .

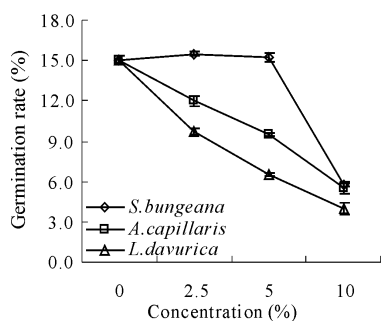


Figure 1 The influence of aqueous leachates from three plant's residues on *P. bifurca* germination rate ($P < 0.05$) .

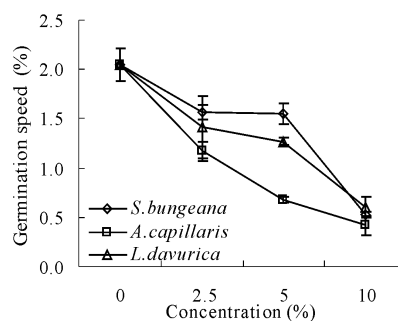


Figure 2 The influence of aqueous leachates from three plant's residues on *P. bifurca* germination speed ($P < 0.05$) .

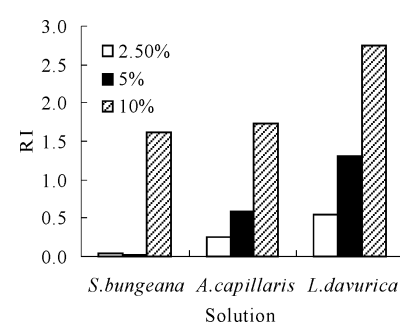


Figure 3 The RI (response index) of three aqueous leachates to *P. bifurca* .

Conclusions The population distribution structure and dynamics are not only affected by the environment but also affected by allelopathy which is the biochemical basis to aid stabilization of an ecosystem . Demonstrating the allelopathy in a natural ecosystem and exploring interconnections with other ecology processes influencing ecosystem functions will make a significant contribution to sustainable management of the natural resource .

Reference

Rice , E . L . , (1984) . Allelopathy . New York . : Academic Press . 421 .