

## Biological absorbing capacity of nutrient elements by some temperate tame grasses

Du Z C , Fan J W , and Zhong H P

Institute of Geographical Science and Natural Resources , Chinese Academy of Sciences , 11 A Datun Road , Beijing 100101 , China , E-mail : zhanchidu@yahoo.com.cn

**Key words :** tame grass , nutrient element , biological absorption coefficient , enriched element , impoverished element

**Introduction** The biological absorption coefficient ( $A_x$ ) is a useful way to evaluate the ability of a plant to absorb certain elements . The index expresses the flux of the chemical element in the soil-plant system and reflects the selective absorbing capacity of the plant on for the particular . Biological absorbing capacity of 10 elements in 6 grasses was studied at mountainous region of north subtropical zone of China in this paper . These provided a scientific basis for managing artificial grassland .

**Materials and methods** The study was conducted at artificial grassland of the Hongchiba area in Chongqin , China ( $109^{\circ}04'E$  ,  $31^{\circ}33'N$ ) at an altitude of 1200 m above sea level . Mean annual temperature was is  $7^{\circ}C$  ; mean rainfall is  $2000\text{ mm year}^{-1}$  . The materials used were 3 leguminous grasses , *Trifolium pretense* , *T. repens* and *T. incarnatum* and 3 forage grasses *Dactylis glomerata* , *Lolium perenne* and *Poa pratensis* . Analytical methods for elements was as follows : N was determined by method of  $HClO_4-H_2SO_4$  nitrification and P , K , Ca , Mg , Fe , Mn , Cu , Zn and B by ICP-AES .  $A_x$  of elements was quantified by the element content of plant divided by that of soil in growth location of the plant ( Tian et al . 1996) .

**Results and discussions** The biological absorbing capacity of a grass for a particular elements could be classified into 2 types , enriched element ( $A_x > 1$ ) and impoverished element ( $A_x < 1$ ) . Table 1 shows that N , P and Ca were enriched elements in aboveground and underground portion of 6 grasses except that P of underground portion in *L. perenne* was an impoverished elements . These results were identical with the reports of Cen (1999) . K , Mg , Fe , Mn , Cu , Zn and B were impoverished elements except that K of aboveground portion of *D. glomerata* is an enriched element . The study results of Tian ( et al , 1996) showed similar outcomes .  $A_x$  of Ca in leguminous grasses was strikingly higher than forage grasses in aboveground portion for 2 type grasses ( $P < 0.01$ ) . As regards 10 elements ,  $A_x$  of N was highest ;  $A_x$  of Fe was lowest in all materials . Compared aboveground portion with underground portion ,  $A_x$  of N , P , K and B of the former were notably larger than those of the latter in 6 grasses ( $P < 0.05$ ) .  $A_x$  of Ca and Zn of the former were markedly larger than those of the latter in 3 leguminous grasses ( $P < 0.05$ ) .

**Table 1** Biological absorption coefficient of nutrient elements in 6 grasses .

	N	P	K	Ca	Mg	Fe	Mn	Cu	Zn	B
<b>Aboveground portion</b>										
<i>Trifolium pretense</i>	17.69	3.01	0.54	10.77	0.45	0.004	0.070	0.329	0.435	0.302
<i>Trifolium repens</i>	22.89	3.79	0.78	10.97	0.29	0.021	0.080	0.366	0.308	0.351
<i>Trifolium incarnatum</i>	21.62	2.58	0.50	7.17	0.27	0.005	0.041	0.265	0.418	0.233
<i>Dactylis glomerata</i>	15.31	5.52	1.03	2.08	0.23	0.004	0.419	0.411	0.517	0.320
<i>Lolium perenne</i>	16.57	2.46	0.79	2.39	0.14	0.005	0.141	0.235	0.342	0.310
<i>Poa pratensis</i>	13.76	3.72	0.76	1.97	0.10	0.011	0.097	0.277	0.374	0.335
<b>Underground portion</b>										
<i>Trifolium pretense</i>	11.42	2.07	0.26	2.50	0.51	0.023	0.044	0.386	0.211	0.186
<i>Trifolium repens</i>	16.43	2.07	0.28	3.56	0.35	0.006	0.035	0.456	0.248	0.277
<i>Trifolium incarnatum</i>	18.39	1.38	0.39	2.13	0.16	0.004	0.030	0.355	0.219	0.202
<i>Dactylis glomerata</i>	11.80	1.86	0.17	3.56	0.16	0.087	0.236	0.632	0.565	0.248
<i>Lolium perenne</i>	11.24	0.95	0.19	1.54	0.04	0.019	0.103	0.274	0.452	0.175
<i>Poa pratensis</i>	8.85	1.67	0.31	1.81	0.06	0.033	0.143	0.340	0.337	0.147

**Conclusions** N , P and Ca were enriched elements ; K , Mg , Fe , Mn , Cu , Zn and B generally were impoverished elements in 6 grasses .  $A_x$  of Ca in leguminous grasses was strikingly higher than forage grasses in aboveground portion .  $A_x$  of N , P , K and B of aboveground portion was notably larger than those of underground portion in 6 grasses .  $A_x$  of Ca and Zn of aboveground portion were markedly larger than those of underground portion in 3 leguminous grasses .

### References

- Chen Y R , (1999) . Study on the bio-accumulations of nutrient element for artificial forest on the experimental plot in Qianyanzhou . *Journal of Natural Resources* , 14 (1) , 84-88 , 1999
- Tian J , Liu P L , Li W Q et al . , (1996) . Characters of element distribution in the Soil-plant system on the Xizang plateau . *Acta Scientiae Circumstantiae* , 16 (1) : 37-43 , 1996 .