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## Estimation of plant N , P and K contents in the Inner Mongolia steppe using SPAD value

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**Key words :** N , P , K , steppe of Inner Mongolia , SPAD

**Introduction** For the last few decades , the Inner Mongolia steppe has been degraded by improper use . As a result , the productivity of grasses and livestock in the steppe has decreased dramatically . Understanding the current state of desertification and the dynamics of degradation of the steppe located at the center of Eurasia is essential for protecting and restructuring this land effectively . A simple and rapid method to evaluate the composition of grasses growing in the steppe is needed . The possibility of estimating N , P and K content of the plants using the SPAD ( Soil & Plant Analyzer Development ) value was examined in the present study .

**Materials and methods** The plant samples were collected from 13 quadrates ( 1 m<sup>2</sup> ) constructed in the traditional steppe , where *Leymus chinensis* and *Stipa* L . are dominant and *Cleistogenes squarrosa* , *Caragana microphylla* and *Artemisia frigida* are subdominant species , around Xilin hot city in Xilin Gol league of Inner Mongolia in August , 2006 . The SPAD readings of 9 points ( upper , middle and lower parts of leaves selected from upper , middle and lower part of a plant ) of a plant were recorded before sampling by using the chlorophyll meter ( SPAD-502 : Konica Minolta Sensing . Inc . Co . ) . Total N , P and K contents of the dried plant samples were measured by Nessler colorimetric and molybdenum-blue colorimetric analysis and flame photometer following the treatment with sulfuric acid and hydrogen peroxide , respectively .

**Results and discussion** Significant positive correlations between N , P or K and the SPAD value were observed in all cases ( Table 1 ) . It was also demonstrated that there were high level coefficients of determination between SPAD readings and K and P contents in plants as well as N , which have a cross correlation with SPAD readings in Chinese grasses ( Lei et al . 2001 ) . On the other hand , it was found that the lower leaves tended to have lower SPAD readings were lower in lower leaves .

**Table 1** Relationships between N , P or K contents and SPAD value of grasses ( n=13 ) collected in steppe of Inner Mongolia .

	Regression	r	r <sup>2</sup>	p
N	y=0 .572x - 7 .386*	0 .981	0 .963	<0 .001
P	y=0 .072x - 1 .109	0 .886	0 .785	<0 .001
K	y=0 .394x - 12 .81	0 .929	0 .863	<0 .001

\* : y = N , P or K ; x=SPAD value

**Conclusion** It was concluded that the SPAD values of plants growing in Inner Mongolia could become good indicators of plant N , P and K contents based on the results obtained in the present study .

### References

Lei , Z . X . , T . C . Ai , F . M . Li . ( 2001 ) . The Relationships between SPAD readings and the contents of Chlorophyll and Nitrogen in strawberry leaves . *Journal of Hubei Agricultural College* . 21 ( 2 ) : 138-140 .