



University of Kentucky  
UKnowledge

---

International Grassland Congress Proceedings

XXI International Grassland Congress / VIII  
International Rangeland Congress

---

## Effect of Nitrogen Application on Forage Yield in Alpine Rangeland

Q. P. Zhou

*Qinghai Academy of Animal Science and Veterinary Medicine, China*

K. J. De

*Qinghai Academy of Animal Science and Veterinary Medicine, China*

C. T. Xu

*Qinghai Academy of Animal Science and Veterinary Medicine, China*

Y. J. Ji

*Qinghai Academy of Animal Science and Veterinary Medicine, China*

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/21/1-6/20>

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

---

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact [UKnowledge@lsv.uky.edu](mailto:UKnowledge@lsv.uky.edu).

## Effect of nitrogen application on forage yield in alpine rangeland

Q .P . Zhou , K .J .De , C .T . Xu , Y .J .Ji

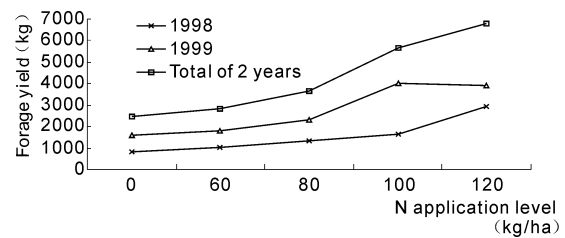
Qinghai Academy of Animal Science and Veterinary Medicine , 1 weierlu Road , Xining , Qinghai , China 810003 .E-mail : qpingzh@yahoo .com .cn

**Key words :** alpine rangeland , N application amount , forage yield increase

**Introduction** Large areas of grassland have been deteriorating due to dry climate , simple vegetation structure , poor quality of forage , overgrazing and damage from pests and rodents . Meanwhile , nutrients for plant growth in alpine rangeland depend on biological and chemical mineralization in soil which has been decreasing in fertility because of consumption by plant growth . Research has indicated that N application improved forage yield and crude protein content , which is an important way to solve the problem of protein shortage in alpine pasture which generally has limited legume content . The objective of this study was to determine the appropriate fertilizer application rate for forage yield and protein content .

**Materials and method** Experiment site was on a fenced winter-spring pasture without grazing at Qinghai San Jiao Cheng Sheep Breeding Farm . The site is 3200-3600m altitude with 321 .7mm annual precipitation -0 .2°C average annual temperature with mountain dry grassland type and dark chestnut-Calcium soil . The vegetation in the grassland mainly consists of *Stipa aliena keng* , *Stipa purpurea Griseb* , *Poa pratensis L* , *Elymus nutans* , *Achnatherum Kansuensis Maxim* , *Potentilla multifida L* and *Bupearum smithii wol et al* . Urea with 46% pure N was applied in June 2003 with different N application amount N<sub>0</sub> , N<sub>60</sub> , N<sub>80</sub> , N<sub>100</sub> , N<sub>120</sub> kg/hm<sup>2</sup> to determine the optimum amount by measuring above ground biomass , plant height , vegetation coverage , density and frequency of plants in 1m<sup>2</sup> sized plots replicated three times .

**Results** Forage yields of plots in different N rates were all improved compared to the control plots in the 1<sup>st</sup> year , the 2<sup>nd</sup> year . The increment and increasing ratio were increased by degrees according the N application amount (Figure 1) . It is indicated that N application in alpine grassland improves grass yield effectively . N application affected vegetation measurements significantly , and grass density , coverage and frequency were improved (Table 1) . In the current experiment , input/output was optimal while 120kg/hm<sup>2</sup> N was applied . Crude protein content in hay was improved along with the increase of N application and obtained the greatest increase with 60-80kg/hm<sup>2</sup> N application .



**Figure 1** Forage yield at different N application .

**Conclusions** The results were same to the experiment carried out at Tongde Batan region on *Puccinellia tenuiflora* , but the optimum N application for the highest yield in this study was lower than the N requirement for the potential highest yield of tall grass (D .R .Che , 1995) , which was 225kg/hm<sup>2</sup> . The grass yield was still increasing while N application amount reached the highest 120kg/hm<sup>2</sup> , which means the optimal N application amount in alpine area has to be decided in future research .

**Table 1** Effect of different N level on rangeland community .

plant composition	community Plant	CK	N <sub>60</sub>	N <sub>80</sub>	N <sub>100</sub>	N <sub>120</sub>
Grasses	Height(cm)	8.3	11.2	15.2	10.8	12.9
	Coverage(%)	37.7	41.7	48.3	48.0	49.0
	Density	109.0	183.0	149.0	161.0	156.0
	Frequency(%)	30.0	57.7	35.7	61.7	85.7
Legume	Height(cm)	2.6	3.0	4.5	3.2	4.8
	Coverage (%)	2.3	4.0	3.0	6.3	4.0
	Density	14.0	55.0	40.0	38.0	36.0
Karex	Frequency(%)	36.0	51.0	40.7	82.3	38.3
	Height(cm)	4.3	5.0	4.8	6.6	6.9
	Coverage	18.0	21.0	24.6	29.0	34.0
others	Density	123.0	193.0	191.0	327.0	413.0
	frequency(%)	77.7	89.3	98.3	100	88.3
	Height(cm)	5.8	6.8	6.5	8.4	8.9
	Coverage (%)	16.7	19.3	18.7	23.7	41.0
	Density	117	121	125	119	206
	Frequency(%)	25.7	33.3	36.7	37	40

### References

- S .J .Zhang(1986) . Effect of Fertilizer on Above Ground Biomass of *Kobresia humilis* meadow . *Alpine Biology Collection* , 5 . 7-11 .  
 D .R .Che (1995) Benefit curve of N fertilizer on Grass at Alpine Rangeland . *ACTA PRATACULTURAE SINICA* , 12 . 1-8 .