



## Forming Mechanism and Classification Standard of "Black-Soil-Type" Degraded Grassland in Yangtze and Yellow River Headwater Region of Qinghai-Tibetan Plateau

Y. S. Ma

*Qinghai Academy of Animal and Veterinary Sciences, China*

Q. M. Dong

*Qinghai Academy of Animal and Veterinary Sciences, China*

S. H. Yang

*Qinghai Academy of Animal and Veterinary Sciences, China*

J. J. Shi

*Qinghai Academy of Animal and Veterinary Sciences, China*

L. Sheng

*Qinghai Academy of Animal and Veterinary Sciences, China*

*See next page for additional authors*

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/21/6-2/8>

The 21st International Grassland Congress / 8th 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).

---

**Presenter Information**

Y. S. Ma, Q. M. Dong, S. H. Yang, J. J. Shi, L. Sheng, Y. L. Wang, and X. D. Sun

## Forming mechanism and classification standard of "Black-Soil-Type" degraded grassland in Yangtze and Yellow River headwater region of Qinghai-Tibetan plateau

Y .S .Ma , Q .M .Dong , S .H .Yang , J .J .Shi , L .Sheng , Y .L .Wang and X .D .Sun  
Qinghai Academy of Animal and Veterinary Sciences , 43 Ningzhang Road , Xining , Qinghai , China .  
E-mail mayushou@sina.com

**Key words :** alpine meadow , "Black-Soil-Type" degraded grassland , distribution , forming mechanism

**Introduction** Alpine meadow comprises a principal part of natural ecosystems , accounting for 90% of the grassland area in Yangtze and Yellow River (YJR) . However , an unreasonable stocking rate and grazing system , and the effect of increasing population , global climate change and natural disaster on alpine meadow ecosystems , grassland has resulted in over half being degraded to different degrees . This has seriously threatened the existence of herds and hindered sustainable development of animal husbandry . This report explores the effects of rodents , overgrazing , and climate change on degraded grassland .

**Materials and methods** There are 16 counties and 1 township in the YJR source region (31°32'~36°16' N , 89°24'~102°15' E , 3500m~4500m) . The climate is dominated by Southeast monsoon and high pressure of Siberia . The average air temperature is 5.4°C~4.1°C . Average annual precipitation is 274.6mm~746.9 mm , above 50% of which falls in the short summer growing season from June to August . According to grassland type and approximate distributing area of "black-soil beach" degraded grassland , 120 sample areas of field investigation and 92 training sample areas of remote sensing were surveyed and inspected in 16 counties and one township . Evaluation indices and classification of degraded grassland follows (Table 1) .

**Table 1** Evaluation indices and classification of degraded grassland .

Degraded ranks	Original vegetation coverage	Ration of palatable forage (%)	Degraded indication plants(%)	0~10cm Content of organic matter(%)	0~10cm Ratio of grass vs soil
I Original vegetation(OV)	>90	>75	<10	>15	<20
II Light degradation(LD)	75~90	55~75	10~30	15~10	20~35
III Moderate degradation(MD)	55~75	35~55	30~50	10~7	35~50
IV Heavy degradation(HD)	45~55	20~35	50~75	7~5	50~75
V Extremely heavy degradation (black soil beach) (ED)	<45	<20	>75	<5	>75

**Results** With the aggravation of degradation , the community quantitative values show a declining trend . No . of species , diversity index and evenness index reached the maximum in MD grassland , the minimum in ED grassland , and the percentage of aboveground biomass for high quality forage reduced abruptly . The similarity index was maximum between OV , LD and MD grassland , and then between LD and MD ; Overstocking has reached to 10<sup>7</sup> sheep units ; *Ochotona curzoniae* pest is not a primary reason of grassland degradation . Grassland degradation can lead to changes of physics characteristics and nutrition factors of soil . With the increase of stocking rates , the average content of organic matter , organic carbon , total N , total P trend decreases , and contents of available N appear changing trend of "S" curve . The increase of average annual air temperature over fifty years was 0.16°C/10a in YJR source region , which is much larger than 0.04°C/10a in other region of China .

**Conclusions** The formation of the "Black-Soil-Type" degraded grassland ecosystem is a result of a range of factors including human activity . According to the different degraded ranks , relevant measures of rehabilitation should be adopted , and the lighter the degraded degree , the earlier and quicker rehabilitation occurs . Restoration of degraded grassland ecosystems has commonly two paths : one is natural restoration and the other is rehabilitation or reclamation by human factors . The lightly and moderately degraded grassland ecosystem can be reversed . Therefore , by fencing closure , weeding , fertilizing , using rodenticide , decreasing stocking rate , optimizing population structure by stocked and slaughter ages , they can be rehabilitated . As for extremely degraded grassland , they no longer can be utilized and the condition cannot be reversed . Therefore , only building artificial and semi-artificial grassland through furrow , scarification and replanting can we restore these heavily degraded systems .

### Reference

Ma , Y .S . , Lang , B .N . & Wang , Q .J . (1999) . Review and prospect of the study on "Black Soil" deterioration grassland . *Prataculture Science* , 16 : 5-8 .