



University of Kentucky  
UKnowledge

---

International Grassland Congress Proceedings

21st International Grassland Congress / 8th  
International Rangeland Congress

---

## Effect of Water Stress and Rehydration on the Physiological and Biochemical Indices of Alfalfa

Y. B. Sheng

*Shandong Institute of Agricultural Sustainable Development, China*

G. L. Wang

*Shandong Institute of Agricultural Sustainable Development, China*

C. L. Jia

*Shandong Institute of Agricultural Sustainable Development, China*

S. Y. Chen

*Shandong Institute of Agricultural Sustainable Development, China*

Q. L. Yang

*Shandong Institute of Agricultural Sustainable Development, 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/21/1-5/43>

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. B. Sheng, G. L. Wang, C. L. Jia, S. Y. Chen, Q. L. Yang, and B. Wu

## Effect of water stress and rehydration on the physiological and biochemical indices of alfalfa

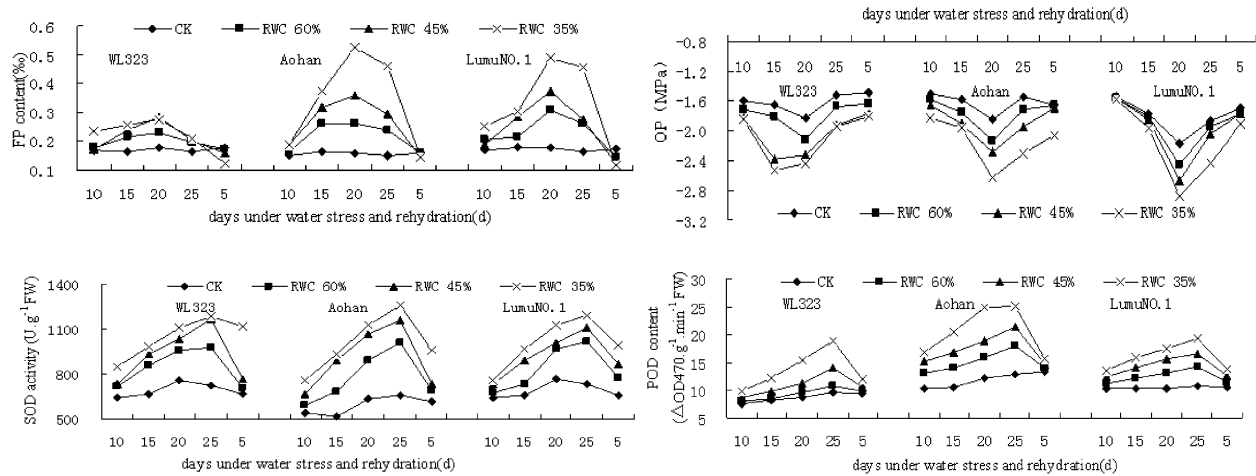
SHENGY B , WANG G L , JIA CH L , CHEN SH Y , YANG Q L , WU B  
 Shandong Institute of Agricultural Sustainable Development , Jinan , Shandong , 250100 , China  
 E-mail : shengyib@hotmail.com

**Key words :** water stress ; physiological and biochemical characters ; *Medicago sativa*

**Introduction** Alfalfa (*Medicago sativa* L . ) , which has high adaptability , a well developed root system , and high yields , is often called " the king of forage crops " ( Bai *et al .* , 2003 ) . The goal of this study was to gain insight into the physiological and biochemical responses of alfalfa to prolonged water deficit and rehydration .

**Materials and methods** Three varieties of alfalfa , WL323 , Aohan , and Lumu NO .1 , were planted in plastic pots ( made from 32 cm lengths of 25 cm diameter plastic ) . The percentage of relative water content ( RWC ) of soil in pots was maintained at 75% ( the control ) , 60% ( light water stress ) , 45% ( moderate water stress ) and 35% ( heavy water stress ) . Treatments were replicated three times . Plants were grown in stress for 25 days and then rehydrated . Plants were sampled once after five days of rehydration . Free proline , osmotic potential , SOD and POD activity of alfalfa leaves were measured ( Li , *et al .* , 2000 ) .

**Results** The content of proline in three alfalfa varieties increased at the beginning , and then decreased after a maximum on the 20th day of water stress . The rates of change of proline content in Aohan and Lumu NO .1 alfalfa were greater than WL323 . Content of proline decreased after 5 days rehydration . The osmotic potential of three alfalfa varieties decreased with the increase in water stress , but increased after 25 days of stress . After rehydration , OP in all the treatments recovered well except for WL323 and Aohan alfalfa with heavy treatment . SOD and POD activity in three alfalfa varieties changed similarly increasing with increasing water stress . With stress , SOD activity increased gradually and was maximum on the 25th day . The rate of change of POD activity in Aohan alfalfa was greater than others , and WL323 was the least , and Lumu NO .1 was intermediate . SOD and POD activity decreased after rehydration ( Figure 1 ) .



**Figure 1** Effect of water stress and rehydration on free proline , osmotic potential , SOD and POD activity in alfalfa leaves .

**Conclusions** Data in this study show the differential antioxidative responses among three alfalfa varieties , which had high levels of an antioxidative enzyme system and free proline accumulation . In conclusion , selection of alfalfa varieties with genetic traits like antioxidants and proline accumulation might be useful in assessing the adaptive responses of alfalfa to water stress .

### References

- Bai W . M . , Li L . H ( 2003 ) . Effect of irrigation methods and quota on root water uptake and biomass of alfalfa in the Wulanbuhe sandy region of China . *Agricultural Water Management* , 62 , 139-148 .  
 Li G . Q . , Du W . J . , Kong Z . S ( 2000 ) . Studies on physiological drought resistance of different soybean varieties . *Journal of Shanxi Agricultural University* , 20(3) , 197-200 .