



University of Kentucky
UKnowledge

International Grassland Congress Proceedings

21st International Grassland Congress / 8th
International Rangeland Congress

Alfalfa Growth and Reproduction as Influenced by Plant Growth Regulators

W. H. Du
Gansu Agricultural University, China

G. Wang
Lanzhou University, China

Z. Z. Cao
Gansu Agricultural University, China

Alan W. Humphries
South Australian Research and Development Institute, Australia

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/21/14-1/26>

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.

Alfalfa growth and reproduction as influenced by plant growth regulators

W. H. Du^{A, B}, G. Wang^B, Z. Z. Cao^A, and Alan Humphries^C

^A College of Grassland Science, Gansu Agricultural University, Lanzhou 730070, China. E-mail: duwh@gsau.edu.cn

^B State Key Laboratory of Arid Agro-ecology, Lanzhou University, Lanzhou 73000, China. ^C South Australian Research and Development Institute, Adelaide, South Australia 5001.

Key words chlormequat (CCC), ethephon (EP), paclobutrazol (PP₃₃₃), alfalfa seed yield, yield components

Introduction Plant Growth Regulators (PGRs) have been widely evaluated for agricultural production (Bai 1992; Buck 1993; Pen 1999). Although studies on the effect of PGRs on alfalfa seed production began in 1970s, they mainly have been done in countries such as Australia, New Zealand and Canada but except for China. And all references showed that PGRs could increase seed yield of alfalfa. But few studies referred to seed yield components. So, the main aim of this study was to see if results about PGRs could work in China under field conditions and to describe in detail how PGRs affect seed yield components of alfalfa.

Materials and Methods The field experiment was established in Wuwei city of Gansu province, located in northwest of China. Three foliar applications of 0.3%, 0.5% and 0.7% CCC, 0.15% and 0.35% EP, and 0.12% and 0.22% PP₃₃₃ at 7-days intervals were applied at the branching stage in 2003 and 2004. Indexes such as above- and underground biomasses, reproductive allocation rate (RAR), harvest index (HI), harvested seed yield, yield components, seed germination, plant height and lodging percentage were determined in the two years.

Results Above ground biomass was decreased with 0.12% PP₃₃₃ by 25% and 0.22% PP₃₃₃ by 48%, and underground biomass was decreased by 44%. The RAR and HI of alfalfa increased by a factor of 3-4 with the application of 0.12% and 0.22% PP₃₃₃ in the two years of the study. Harvested seed yield was increased with 0.12% PP₃₃₃ by 31-46% and 0.22% PP₃₃₃ by 46-47%. In 2003, the number of racemes per shoot were increased with 0.22% PP₃₃₃ by 65%, 0.15% EP by 35%, and 0.7% CCC by 30%; the number of pods per raceme were increased with 0.22% PP₃₃₃ by 341%, 0.12% PP₃₃₃ by 185%, 0.15% EP by 176%, 0.3% CCC by 164%, and 0.35% EP by 95%. In 2004, 0.22% PP₃₃₃ increased number of racemes per shoot by 12%; the number of pods per raceme were increased with 0.22% PP₃₃₃ by 442%, 0.12% PP₃₃₃ by 274%, 0.15% EP by 272%, 0.3% CCC by 192% and 0.35% EP by 85%. In two years, the highest number of seeds per pod was gained under PP₃₃₃ treatment, which increased them by 84-88% in 2003 and 141-144% in 2004. Among yield components, the number of pods per raceme and the number of seeds per pod were the most important factors to determine alfalfa seed yield.

Conclusions PP₃₃₃ was the best PGR in alfalfa seed production, which increased seed yield by reducing plant heights, increasing lodging resistance ability, the number of racemes per shoot, the number of pods per raceme and the number of seeds per pod. This PGR had no ill effect on seed quality. Of the two rates tested, the highest rate (0.22%) had the greatest effect on improving seed yield. Further research is recommended to investigate the effect of different rates of applied PP₃₃₃ across a number of environments in China and around the world as a basis for developing recommendations to the alfalfa seed production industry.

References

- Bai, B. Z., 1992. Plant physiology. *Agricultural Press of China*, Beijing, 183pp.
- Buck, D. C., 1993. The effects of various plant growth regulators on the nutritive value, yield and stand composition of some forage species and forage mixtures. *Dissertation Abstracts International B, Sciences and Engineering* **53**(7), 95-101.
- Pen, Y. M., 1999. Studies on physiological effect and utilization of PGRs on forage and forage crops. *Grassland of Inner Mongolia* **4**, 54-57.