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Yibao Jiang

*Henan Agricultural University, China*

Guowen Cui

*Northeast Agricultural University, China*

Chengzhang Wang

*Henan Agricultural University, China*

Xuebing Yan

*Henan Agricultural University, China*

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## Effect of calcium on drought resistance of alfalfa seedling

Yibao Jiang<sup>1</sup>, Guowen Cui<sup>2</sup>, Chengzhang Wang<sup>1</sup>, Xuebin Yan<sup>1</sup>

<sup>1</sup>College of Animal Science, Henan Agricultural University, Zhengzhou 450002, China, E-mail: yibaojiang@sina.com; <sup>2</sup>College of Animal Science, Northeast Agricultural University, Harbin 150030, China

**Key words:** alfalfa, calcium, drought stress, physiology indexes, chloroplast

**Introduction** Alfalfa (*Medicago sativa* L.) was a perennial forage in the pulse family. It is characteristic of producing good quality forage under favorable conditions. But, in the northeast part of China, drought stress is one of important agents that limit its production and its use. Exogenous calcium could alleviate the damaging effects of drought on plant (Poovaiah and Reddy, 1987). This experiment investigated the effect of seed-immersing in calcium solution on alfalfa seedling-physiology indexes under drought stress.

**Material and methods** The materials for experiments were alfalfa (*Medicago sativa* L.) cv. Aohan. For the treatment group, seeds were immersed in a 10 mmol/L CaCl<sub>2</sub> solution for 18 hours, while the control group used seeds immersed in distilled water only. After alfalfa seedling had grew 25 days after sowing, followed by growing under conditions differing in water availability. Soil moisture content was 75%, 50%, 35% individually. Relative water content of leave, cell membrane permeability (relative electric conductivity), POD enzyme activity and chlorophyll content were observed. And chloroplast structure of leaves was observed by JEM-1200 Transmission Electron Microscopy.

**Results** Compared with the control, added calcium increased the relative water content of alfalfa leaf under 50% and 35% soil moisture content ( $P < 0.05$ ) (Table 1). Calcium could also increase POD enzyme activity and chlorophyll content ( $P < 0.05$ ) (Table 1). And immersing alfalfa seeds in calcium alleviated membrane penetration and the damage of water stress on chloroplast (Figure 1).

**Table 1** Effect of calcium on alfalfa seedling physiology indexes under drought stress.

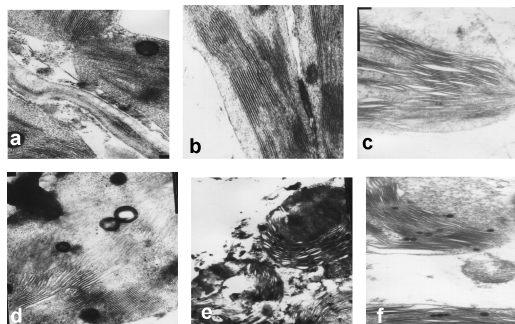
Soil moisture content		75%	50%	35%
Relative water content (%)	Control	95.47	75.71	66.78
	Treatment	95.08	79.27 *	72.35 *
Relative electric conductivity (%)	Control	13.31	24.27	47.36
	Treatment	13.47	18.35 *	36.89 *
POD enzyme activity (U · g <sup>-1</sup> · h <sup>-1</sup> )	Control	56.71	73.61	85.77
	Treatment	55.53	82.25 *	92.31 *
chlorophyll content (mg · FWg <sup>-1</sup> )	Control	11.25	9.63	6.75
	Treatment	11.38	10.50 *	8.11

\* " means  $P < 0.05$

**Conclusions** These results indicated that 10 mmol/L CaCl<sub>2</sub> solution immersing alfalfa seeds may improve the plant drought resistance. Calcium has potential role in alleviating injury of drought on alfalfa seedling and enhancing alfalfa production under drought stress.

### Reference

Poovaiah BW, Reddy AS, 1987. Calcium messenger system in plants. *Critical Review in Plant Sciences* 6 (1): 47-103.



**Figure 1** Change of chloroplast structure of Alfalfa under different soil moisture containing a. control, 75%, × 40K; b. Treatment, 75%, × 40K; c. control, 50%, × 40K; d. Treatment, 50%, × 40K; e. control, 35%, × 12K; f. Treatment, 35%, × 20K