

研究论文

## 硅对紫花苜蓿生物学特性的影响

郭正刚<sup>1</sup>, 田福平<sup>2</sup>, 王锁民<sup>1</sup>, 张自和<sup>1</sup>

1. 兰州大学草地农业科技学院 农业部草地农业生态系统学重点开放实验室, 兰州730020

2. 中国农业科学院兰州畜牧与兽药研究所, 兰州730070

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**摘要** 硅是植物生长发育的有益元素, 目前关于硅对植物生长发育影响的研究多集中于禾本科和部分瓜果蔬菜, 对豆科植物的研究仅限于大豆和豇豆, 而对多年生豆科牧草的研究很少。通过盆栽试验观测了硅对豆科牧草紫花苜蓿生物学特性的影响。结果表明, 紫花苜蓿体内硅的含量随着施入硅量的增加而增加, 但在0.100 g/kg水平后紫花苜蓿吸收硅趋向于饱和。紫花苜蓿根系内的硅含量大于茎叶内含量; 硅对紫花苜蓿叶面积的影响呈单峰型分布, 0.05 g/kg的硅处理增加效果最为明显; 硅对紫花苜蓿分枝数和株高的影响与测定时期有关, 分枝数在营养期差异不明显, 在生殖期施硅显著增加分枝数 ( $p<0.05$ ), 但施硅在营养生长阶段显著增加株高( $p<0.05$ ), 而生殖期差异不明显; 施硅能够显著增加紫花苜蓿草产量和根系生物量, 增幅分别为20%~60%和35%。中部叶和上部叶与茎之间的夹角随着施硅量的增加而逐渐减少, 但减少的幅度随着施硅量的增加而逐渐降低, 而下部叶与茎之间的夹角变化较为复杂, 随着施硅量的增加, 先减小后增加, 再减小。试验结果表明, 施入适量的硅有利于紫花苜蓿的生长和发育。

**关键词** 硅; 紫花苜蓿; 硅浓度; 茎叶; 根

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## Effect of silicon supply on alfalfa growth

GUO Zheng-Gang<sup>1</sup>, TIAN Fu-Ping<sup>2</sup>, WANG Suo-Min<sup>1</sup>, ZHANG Zi-He<sup>1</sup>

1. Key Laboratory of Grassland Agro-Ecosystem Ministry of Agriculture, College of Pastoral Agricultural Science and Technology, Lanzhou University, Lanzhou 730020, China;

2. Lanzhou Institute of Animal Science and Veterinary Pharmaceutical Science of Chinese Academy of Agricultural Science, Lanzhou 730050, China

**Abstract** Although silicon is a quantitatively major inorganic constituent of higher plants, this element is not considered generally essential for them. Its beneficial effects have been observed in various plant species. Alfalfa (*Medicago sativa*) is significant in dryland farming system due to contributing to animal production, establishing pasture, rotation system. However, the role of silicon in alfalfa growth remains ambiguous. Therefore, it is essential to define well the role of Si in the alfalfa growth. An available silicon (Si)-deficient top soil was used in a pot experiment to investigate the effect of Si supply on the biological properties of alfalfa. The treatments consisted of six rates of addition of available Si: 0, 0.025, 0.05, 0.10, 0.20, 0.30 g kg<sup>-1</sup> (H<sub>4</sub>SiO<sub>4</sub>/soil) and each was replicated six times. This study indicated that the silicon content of roots and shoots increased significantly ( $p<0.05$ ) with increasing Si supply in the soil, and this increasing tendency reduced greatly when application Silicon was over 0.100 g/kg. Silicon content in roots was greater than that in shoots. Plants with Si supply had a significantly larger leaf area than no-feed Si plants, and leaf area peaked in the 0.05 g/kg treatments. Effect of Si supply on height and shoots were related to the growing stages of plants. In the vegetative period, shoots per plant was not different but significant increase was observed in the reproductive period. Fed-Si plants had higher height than control in the vegetative period. This study also indicated that fed-si plants had higher forage biomass than control, and was up 20%~60%. The effects of adding Si also significantly increased root biomass compared with controls and were up over 35%. Angle between leaf and stem showed the decrease trend

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end in the upper and middle leaf, and this trend reduced with increase of Si supply. Angle between leaf and stem in the lower leaf first increased and then decreased with increase of Si supply. Overall, overcoming Si deficiency resulted in a significant increase in shoot and root growth.

**Key words** [silicon](#) \_ [alfalfa](#) \_ [silicon concentration](#) \_ [shoots](#) \_ [root](#)

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通讯作者 郭正刚 [zhenggangguo200@yahoo.com.cn](mailto:zhenggangguo200@yahoo.com.cn)