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不同供磷水平对饭豆体内铁有效性的影响

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Effect of phosphorus supply on iron efficiency in rice bean(Vigna umbellata)

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摘要 采用溶液培养试验研究了低铁条件下（1 μmol/L FeEDTA）不同供磷水平P 3、30和300 μmol/L对饭豆叶绿素含量、生物量、铁含量以及质外体铁的影响。结果表明，饭豆叶片叶绿素含量及根系干重均随磷处理浓度的增加而显著降低； 低磷处理的植株地上部的铁含量明显高于中磷和高磷处理。随着供磷水平的增加，地上部和根系总铁量的比值呈降低趋势，说明铁由根系向地上部的转运显著减少，从而加剧了植株缺铁症状。进一步分析发现，低磷处理的根系质外体铁含量显著低于中磷和高磷处理。说明在铁吸收过程中，供磷水平增加促使铁在根系质外体空间中的固定，不利于根系中的铁转运至地上部，这可能是磷是对铁产生拮抗作用造成植物铁营养不利的原因之一。

关键词： 铁 磷 根 质外体 叶绿素

Abstract： In low iron condition (1 μmol/L FeEDTA), hydroponic experiments were carried out to study the effects of different phosphorus supply levels: P 3, 30 and 300 μmol/L on iron efficiency in rice bean (*Vigna umbellata*). The results indicate that chlorophyll contents in leaves and dry weights of roots are all significantly decreased along with increase of phosphate supply amounts, and iron content of shoots by the low-P supply is also higher than that of other two treatments. The ratios of shoot total Fe to root total Fe are reduced with the increase of P supply levels, which indicates that the transportion of root Fe to shoot might be blocked, and thereby Fe deficiency is stimulated. Further analysis shows that apoplastic Fe concentration of roots is remarkable lower in the low-P treatment than that of the high P supply levels. These results indicate that the increase of P supply enhances the Fe fixtion in the apoplast of root during Fe acquisition, and consequently inhibites Fe transfer from root to shoot. This may be a mechanism that how the P antagonisticly acts on Fe, and also a reason why high P supply is disadvantageous to Fe nutrient status of plants grown in low Fe condition.

Keywords： iron;phosphorus root apoplast chlorophyll

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