

Effects of Excess-Iron Stress on Symbiotic Nitrogen Fixation Efficiency of Yardlong-Bean Plants

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Abstract : Excess-iron (Fe) stresses involved in legume symbiotic nitrogen fixation are not understood. Our objectives were to investigate the tolerance of yardlong-bean plants to soil excess-Fe stress and antagonistic effects of organic amendments and rhizobial inoculants on plant root nodulation and stem ureide formation. The study was conducted in the tropical Hainan Island during 2012-2013. The soil was strongly acidic (pH 5.3 ± 0.4) and highly variable in Fe concentrations (596 ± 79 mg/kg). The treatments were arranged in a split-plot design with three blocks. The treatment effects were significant on root nodulation, stem ureide, amino acids, plant N/Fe accumulation and bean yields ($P < 0.05$). The yardlong-bean stem allantoin, amino acids and nitrate concentrations and relative ureide % declined with high soil Fe concentrations (> 300 mg/kg). It was concluded that the co-variance of excess Fe stress could inhibit legume symbiotic N fixation efficiency. Organic amendments and rhizobial inoculants could help improve crop tolerance to excess Fe stress.

Keywords : atmospheric N fixation, root nodulation, soil Fe co-variance, stem ureide, yardlong-bean plants

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