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

Authors : Hong Li, Tingxian Li, Xudong Wang, Qinghuo Lin

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 \pm 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

Conference Title : ICAE 2014 : International Conference on Agricultural Engineering

Conference Location : Montreal, Canada

Conference Dates : May 12-13, 2014

1

ISNI:000000091950263