

Abstract

Iron (Fe) is an essential micronutrient for plants whose deficiency presents a major worldwide agricultural problem. Chelated forms have been used to avoid iron deficiency in soil for a long time. Nano iron forms are under research now to investigate its effect on iron availability. In this research different iron forms (chelated Fe fertilizers, conventional and Nano) were used to compare their effects on plant growth, physiological processes (photosynthesis, transpiration and stomatal conductance), anatomical characteristics, nutrients concentration and uptake and total yield & yield quality. A 2 x 3 x 3 factorial experiment in randomized block design with 4 replications for each treatment combination under greenhouse conditions was conducted in Ohio State University USA. Two vegetable crops, Tomato and Cucumber were planted. Three types of Fe fertilizers were added to soil, chelated Fe (EDDHA), conventional Fe fertilizer ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$) and Nano Fe (Fe_2O_3) fertilizer. Three levels [control (0), 50 and 100 mg/kg^{-1}] of cultivated soil of each Fe fertilizer were used. Different morphological characteristics of cucumber and tomato, physiological processes and anatomical characteristics were measured, nutrients concentration and uptake were determined, yield characteristics and total yield were recorded. Among the Fe sources, Nano-Fe increased chlorophyll content and accordingly improved photosynthesis and plant growth, systematically organized the conducting anatomy to increase nutrient uptake by plants and improved yield and quality of fruits as compared with conventional- and chelated Fe fertilization.

Key words: Cucumber plants, Tomato plants, Nano Fe, chelated Fe, photosynthesis, transpiration, stomatal conductance, leaf and stem anatomy, yield, nutrients concentration and uptake.