SILICON FERTILIZERS: PAST, PRESENT AND FUTURE

V.V. MATICHENKOV[1]; E.A. BOCHARNIKOVA[2]

[1]Insti. of Basic Biological Problems, Russian Academy of Sciences,Russia; [2]Inst. Phys.-Chem. and Biol. Problems in Soil Sci. Russian Acad. of Sci., Pushchino, Russia. - vvmatichenkov@rambler.ru

In agriculture of ancient Roman and China Empires some types of silicon (Si) fertilizers including plant ash were used for optimization of plant Si nutrition and for restoration of degraded soils. In the XIX century, the first investigation of the role of Si in plant growth and the use of Si fertilizers were just beginning. Sir Humphey Day, Alexander von Humboldt, Justius von Liebig, J.B. Lawes, D. Mendeleev, Isenoke Onodera, V. Vernadsky were pioneers in this area that involved Si chemistry. Laboratory, greenhouse and field experiments on all continents and all climatic zones have shown substantial benefits for silicon fertilization of rice, corn, wheat, barley, sugar cane as well as several other crops. There are three main reasons for silicon fertilization: (1) improved silicon nutrition in the plant reinforces the plant natural protective properties against diseases, insect attack and unfavorable climatic conditions; (2) the soil treatment with biogeochemically active substances containing silicon optimizes soil fertility through improved water, physical, and chemical soil properties and aids the maintenance of other nutrients in plant-available form; and (3) various ecologically safe industrial by-products may be used as silicon fertilizers, many of which help solve the problem of proper utilization of numerous industrial wastes. Because of these reasons, it is evident that silicon fertilizers should be used more extensively than they are presently. Frankly, silicon fertilizers are not used more extensively world-wide because there is a critical lack of specialists working to show the importance of silicon as a fertilizer material.

Index terms: silicon fertilization, silicon history.

EVALUATION OF TWO SILICON SOURCES ON CHEMICAL CHARACTERISTICS OF AN ACID SOIL FROM THE CERRADO AND DRY MATTER YIELD OF TWO SORGHUM GENOTYPES

E.A. SILVA[1]; G.V.E. PITTA[1]; C.R. CASELA[1]

[1]Embrapa Milho e Sorgo, 151, CEP: 3570[1]970, Sete Lagoas, Minas Gerais. gpitta@cnpms.embrapa.br

The effect of two sources of silicon on dry weights of two sorghum genotypes and on some soil chemical characteristics were evaluated in greenhouse The sources of silicon were: yoorin thermophosphate (TFY) containing 18% of P_2O_5 and 10% of silicon (Si) and a steel industry byproduct called "Agrosilício" (Recmix do Brasil S.A) with 6.46% Si, 0.42% P_2O_5, 36% CaO and 6% MgO. The two sorghum genotypes used were from the breeding programme of Embrapa Maize and Sorghum Center. The treatments consisted of three levels of Si of each source: 0.120 and 240 mg Si kg^{-1} soil for the TFY and due to its composition, 0, 86 and 172 mg P kg^{-1} soil were added to the soil and 0, 150 and 300 mg Si kg^{-1} soil for the "Agrosilício". The levels of phosphorus were compensated in every treatment independently of the Si source based on the highest Si level. The results showed that increases rates of Si resulted in significant increases in the pH and base saturation (V%) values, thus dramatically decreasing the aluminium saturation (Al%), especially when the Si source was the TFY. The Ca:Mg ratios, in the abscense of Si, varied from 1:14 to 1:28 with TFY and "Agrosilício", respectively, to 1:2,5 at the highest Si level for both sources. No great differences were observed between the dry weights of the genotypes for either Si source, but values were slightly higher with the TFY source. The most significant effects of Si sources in these trial were on the soil variables, principally on the Ca:Mg ratios and for changes in soil acidity, especially when the source was the "Agrosilício" byproduct probably due to its high content of calcium and magnesium silicate.

Index terms: silicon, soil acidity, sorghum genotypes.