

Effect of kaolinite amendment on rice tolerance to iron toxicity

Sylvain Sehi Zokagon^{1,*}, Brahim Koné², Affi Jeanne Bongoua Devisme², Mamadou Cherif³, Yao-Kouamé Albert²

¹*Centre d'Excellence Africain sur le Changement Climatique, la Biodiversité et l'Agriculture Durable, Université Félix Houphouet Boigny, Abidjan, 22BP 582 Abidjan 22, Côte d'Ivoire;*

²*Département des Sciences du Sol, Université Felix Houphouet Boigny, Abidjan, 22BP 582 Abidjan 22, Côte d'Ivoire;* ³*Département de Physiologie Végétale, Université Felix Houphouet Boigny, Abidjan, 22BP 582 Abidjan 22, Côte d'Ivoire*

*E-mail: sehisylvain_nung@yahoo.fr

Shorted accesses to the industrial silicon for the control of iron toxicity in the rice-growing is limiting this farm practice whatever efficient however. Hence, the opportunity is to explore kaolinite (54.7% SiO₂) potential as a natural and cheaper source of silicon for rice growing. Pot experiment was set applying 900 ppm of iron in 5 kg of sand as substratum before applying five treatments of kaolinite (T0 = 0 kg kaolinite/ha, T1 = 366 kg kaolinite/ha, T2 = 1735 kg kaolinite/ha, T3 = 1097 kg kaolinite /ha and T4 = 1465 kg kaolinite/ha) in a randomized complete block design with five repetitions.

The results show kaolinite improvement effect in rice growth and the development of root stuff under iron toxicity condition (900 ppm Fe). The evidence of the root stuff development was shown by the increasing of length (16-20 cm) with the treatments T3 and T4 against 12 cm observed in treatment T0. Microscopic observation of the rice roots showed an increasing of the number of root ramifications consequently to kaolinite level. Only primary ramifications were observed in T0 when secondary and tertiary ramifications were observed with the treatments T3 and T4. In consequence, the grain yield was accordingly in the range of 4.25 t/ha (T0) and 8.69 t/ha (T4).

Therefore, the research recommends the kaolinite as sustainable way of iron toxicity management with the dose 1465 kg of kaolinite/ha corresponding to 800 kg of SiO₂/ha.