

Utilization of Silicon for Sustainable Rice Yield Improvement in Acid Sulfate Soil

Authors : Bunjirtluk Jintaridith

Abstract : Utilization of silicon for sustainable rice cultivation in acid sulfate soils was studied for 2 years. The study was conducted on Rungsit soils in Amphoe Tanyaburi, Pathumtani Province. The objectives of this study were to assess the effect of high quality organic fertilizer in combination with silicon and chemical fertilizer on rice yield, chemical soil properties after using soil amendments, and also to assess the economic return. A Randomized Complete Block Design (RCBD) with 10 treatments and 3 replications were employed. The treatments were as follows: 1) control 2) chemical fertilizer (recommended by Land Development Department, LDD) 3) silicon 312 kg/ha 4) high quality organic fertilizer at 1875 kg/ha (the recommendation rate by LDD) 5) silicon 156 kg/ha in combination with high quality organic fertilizer 1875 kg/ha 6) silicon at the 312 kg/ha in combination with high quality organic fertilizer 1875 kg/ha 7) silicon 156 kg/ha in combination with chemical fertilizer 8) silicon at the 312 kg/ha in combination with chemical fertilizer 9) silicon 156 kg/ha in combination with ½ chemical fertilizer rate, and 10) silicon 312 kg/ha in combination with ½ chemical fertilizer rate. The results of 2 years indicated the treatment tended to increase soil pH (from 5.1 to 4.7-5.5), percentage of organic matter (from 2.43 to 2.54 - 2.94%); avail. P (from 7.5 to 7-21 mg kg⁻¹ P; ext. K (from 616 to 451-572 mg kg⁻¹ K), ext Ca (from 1962 to 2042.3-4339.7 mg kg⁻¹ Ca); ext Mg (from 1586 to 808.7-900 mg kg⁻¹ Mg); but decrease the ext. Al (from 2.56 to 0.89-2.54 cmol kg⁻¹ Al. Two years average of rice yield, the highest yield was obtained from silicon 156 kg/ha application in combination with high quality organic fertilizer 300 kg/rai (3770 kg/ha), or using silicon at the 312 kg/ha combination with high quality organic fertilizer 300 kg/rai. (3,750 kg/ha). It was noted that chemical fertilizer application with 156 and 312 kg/ha silicon gave only 3,260 and 3,133 kg/ha, respectively. On the other hand, half rate of chemical fertilizer with 156 and 312 kg/ha with silicon gave the yield of 2,934 and 3,218 kg/ha, respectively. While high quality organic fertilizer only can produce 3,318 kg/ha as compare to rice yield of 2,812 kg/ha from control. It was noted that the highest economic return was obtained from chemical fertilizer treated plots (886 dollars/ha). Silicon application at the rate of 156 kg/ha in combination with high quality organic fertilizer 1875 kg/ha gave the economic return of 846 dollars/ha, while 312 kg/ha of silicon with chemical fertilizer gave the lowest economic return (697 dollars/ha).

Keywords : rice, high quality organic fertilizer, acid sulfate soil, silicon

Conference Title : ICSSPN 2019 : International Conference on Soil Science and Plant Nutrition

Conference Location : Paris, France

Conference Dates : January 24-25, 2019