

Pattarasawan Sangkum 2009: Effects of Na-Bentonite on Soil Properties and Growth of Rayong 5 Cassava Variety. Master of Science (Soil Science), Major Field: Soil Science, Department of Soil Science. Thesis Advisor: Assistant Professor Arunsiri Kumlung, D.Agr. 157 pages.

The effects of some remediation methods for Na-bentonite polluted soil on growth of Rayong 5 cassava variety were examined according to series of 2 experiments. Experiment I was arranged at the laboratory of Soil Science Department. It was the study on the relationship of Na-bentonite rates on the changes of soil properties. The treatments consisted of 6 Na-bentonite pollution rates of 0, 5, 10, 15, 20 and 25% (w/w). The results showed that correlation coefficients of the relationship between Na-bentonite pollution rates and soil properties were highly significant. Polluted soil had higher values of pH,  $EC_e$ , exchangeable Na, CEC, ESP and SAR. The parallel experiments were conducted to study the effects of rice husk and compost on hydraulic conductivity of Na-bentonite polluted soils. The Na-bentonite was applied to soil at the rates to yield 5 levels of soil exchangeable sodium percentage (ESP), namely, 5, 10, 15, 20, and 25%. This was done via the equation relating rates of application and ESP values of the soil earlier calibrated. The results showed that applying rice husk to Na-bentonite polluted soils gave higher hydraulic conductivity values than applying compost. Experiment II was studied in the greenhouse of Soil Science Department. It was the study on the effects of Na-bentonite polluted at the rates 5, 10, 15, 20 and 25% (w/w) on growth of Rayong 5 cassava variety. The experimental design was CRD with 6 treatments and 4 replications. The results showed that the effect of treatments on cassava height at 1 and 3 months of age were significantly different. The plant grown on Na-bentonite polluted at 25% (w/w) was shorter than the control (no Na-bentonite) and Na-bentonite pollution rate between 5-20% (w/w). Height difference of cassava plant at 2, 6, 9, and 12 months were found none significant among treatments. Therefore, the Na-bentonite pollution rate of 25% (w/w) was selected for the soil reclamation experiments. The experimental design of such experiment was 4 x 3 factorial arrangement of treatments plus control in completely randomized design having 4 replications. Two methods of remediation consisting of gypsum application at the rate of 0, 1/4, 1/2 and 1 GR (1 GR = amount of gypsum providing  $Ca^{2+}$  that can replace all  $Na^+$  from 25% Na-bentonite polluted soils) and rice husk application at the rate of 0, 0.5 and 1.0% of soil mass. The results showed that the effect of treatments on cassava height at 1- 2 months of ages were significantly different. The height of control plants (no Na-bentonite) were higher than Na-bentonite polluted at 25% (w/w), but at the ages of 3-12 months heights of the plants were not significantly different. Among different remediation methods, gypsum rates have a none significant effect on plant growth. Applying rice husk at 0.5% (w/w), the cassava height at 3 months of age was significantly higher than rice husk applied at the rates of 0 and 1.0%. The interactions of gypsum and rice husk at 1- 2 months of ages were significantly different. But at the ages of 3-12 months, the tendency was found that rice husk application at 0.5% to all levels of gypsum resulted taller plants than when applied at 0 and 1.0%.

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Student's signature

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Thesis Advisor's signature