

Jittanun Rungsimantuchat 2006: Effect of Simulated Rain Containing Sulfate and Oxide of Nitrogen on Chemical Properties and Plant Nutrition of Soils.

Master of Science (Agriculture), Major Field: Soil Science, Department of Soil Science.


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ISBN 974-16-2652-5

The objectives of this research were to evaluate the effects of two types of simulated acid rain, namely simulated sulfate (SSAR) and (SNAR) nitrate acid rains, on chemical soil properties and major plant nutrient availabilities, plant nutrient uptakes, and physio-phenotypic characteristics and of tested plants. Selected plants were grown on the 4 different soils, namely Ayutthaya, Bangkok, Kamphaeng Saen, and Sattahip soil series. The 2 types of simulated acid rains were separately tested for their effects. Totally tested plants were sprayed with the 2 types of simulated acid rain for 49 times each along the courses of their growth. Both SSAR and SNAR acid rains held 4 degrees of acidity, i.e. control (pH 6.7) and acidities of 5.0, 4.0 and 3.0 pH. Okra (*Abelmoschus esculentus* Linn. Moench var. Mon, F₁ hybrid) was used as tested plants. Along the courses of this experiment, soil, plant tissue, and fruit samples were collected to analyzed for their chemical properties, nutrient availability, fresh and dry weights, phenotypic characteristics, and leaf water potentials. Micro-climate data of the greenhouse were also collected. Experimental results showed that both types and all acidity degrees of simulated rainfalls did not affect soil nutrient availability. The ratios of nutrient uptakes to their corresponding total amounts (${}_{\mu}K_d$) were largely dependent on types of simulated acid rain and their acidic severities. The acidic severity values of pH<4.0 of the SSAR tended to give the higher values of ${}_{\mu}K_d$. While the acidic severity values of pH<5.0 of the SNAR tended to give the lower values of ${}_{\mu}K_d$. Results also showed that the yields of tested plants were very poor and were lower than those of farmers' practices. This might be caused by the selected soil series used in this experiment which were not suit to raise okra. In addition, both types of simulated acid rains directly impacted tested plants which led to the necrosis symptom on leaf veins and on some parts of the plant leaves. Leaf color became yellow or brown. Leaf margin burn, witches bloom and incomplete leaf development were also observed. Some parts of stem and fruit were swelled. However, either type of simulated acid rains or any degree of acidic severities did not affect leaf water potentials, indicating that simulated acid rains did not harm the process of plant water uptake. When compared between the effects of the 2 types of simulated acid rains on soil-N availability, SSAR gave higher availability than that of the SNAR.

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