UNIVERSITI
TEKNOLOGI
MARA

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 10, Issue 10 October 2016

TENTH ISSUE

INSTITUTE of GRADUATE STUDIES

IGS Biannual Publication

13

Name : NUR QURSYNA BINTI BOLL KASSIM

Title : NUTRIENTS DYNAMICS IN PINEAPPLE (*Ananas comosus* L.) PLANTED PEAT SOIL UNDER FLUCTUATING WATER TABLE

Supervisor : ASSOC. PROF. DR. ADZMI YAACOB (MS)
ASSOC. PROF. DR. HJ. ZAIN HAMZAH (CS)
ASSOC. PROF. DR. ABD RASHID AHMAD (CS)
PROF. DR. HJ. KU HALIM KU HAMID (CS)

Peat soil was renowned for its low nutrient availability which limits its potential for extensive agriculture use. Continuous shifting of aerobic and anaerobic condition due to fluctuating water table could lead to biogeochemical changes of the soil that could affect the cycling of nutrients in the peat system. Understanding such changes on the nutrient dynamics will help in the management and the agronomic practices of pineapple plantation on peat soil. This study assess the dynamics of N, P and K in peat soil under fluctuating water table using laboratory simulation and nutrient balance estimation approach. The effect of rainfall, fate of applied fertilizer and lime and the nature of peat were studied in relation to changes in N, P and K. In the study, Nitrogen continue to decrease together with available P and the exchangeable bases (K, Ca, Mg and Na) in pineapple-cultivated peat compared to undisturbed peat despite the application of fertilizer. This could indicate that the nutrients are heavily leached by the alternating water table or they are readily taken up by the growing pineapple crops or they are readily fixed by the acidic peat soil. Fertilizer requirement in this system is therefore high in order to cope with leaching, potential fixation and uptake activity. Very little NO_3^--N was detected in the NPK fertilized aerobic peat while the application of urea resulted in significant amount of NH_4^+-N found in both aerobic and anaerobic peat soil. The fluctuating water table in the peat profile which was significantly related with the amount of precipitation could have speed up the leaching of NO_3^--N as it was highly soluble and unlikely to be adsorbed by the peat. The NH_4^+-N ions is better retained by the peat due to its positively charged nature and those that are leached can still be trapped by the underlying mineral. The ability of the mineral soil to adsorb and release nutrient ions in particular the cations could allow for nutrient recharging of the upper layers of peat when water table is high. The simulation study in the laboratory using a designated soil column showed that the concentration of total N and mineral-N (NO_3^--N and NH_4^+-N) was maximized when the water table was maintained at 40 cm. When the water table was fluctuated between 0-40 cm depth (representing the water table during wet season), soil available P reached its highest concentration in the soil. The fluctuation of water table between 40 - 80 cm depth (representing the water table during dry season) allows the gradual release of exchangeable K, Ca, Mg and Na. Without crops uptake, all of the treatments display a positive soil nutrient balance. In the presence of uptake by pineapple, a negative nutrient balance was observed for all treatments where the treatment with fluctuating water table between 0-40 cm recorded the highest nutrient deficiency. The study indicated that the fluctuating water table affects the different nutrients differently. Wet season tend to increase available P in peat soil while dry season encourage more decomposition and reduce leaching of major cations. Intermediate season tend to improve nitrate and ammonium availability in the peat system. Thus agronomic practices especially fertilizer application may have to take the rainfall factors into consideration.