

(31)

Carbon sequestration of Azolla and soil nitrogen mineralization

Sinthu Surenthiran* and Puvaneswary Loganathan

Faculty of Applied Science, Vavuniya Campus, University of Jaffna, Sri Lanka

*susinthu@gmail.com

Abstract

Carbon sequestration minimizes the climate change and incorporation of green manures is a one way to minimize the nitrate leachate in soil. To conquer these problems, aquatic, nitrogen and carbon fixing fern Azolla was cultivated in temporary tank to investigate the growth rate, carbon fixation rate, nitrogen fixation rate of Azolla and leaching column experiment was carried out to measure the nitrate leachate in soil after incorporation of Azolla with comparing other green manures and urea. Treatments were T1 (Control), T2 (Urea), T3 (Sunhemp), T4 (Azolla) and T5 (Gliricidia). RCBD design was used with three replicates for soil nitrogen mineralization in soil leaching column. Result of Azolla experiment showed that growth rate of Azolla was 106.45 tonne per ha per year fresh bio mass, Total nitrogen percentage of the Azolla was 5.89%. Azolla fixed 0.33 tonne nitrogen and 1.86 tonnes CO₂ in 1 ha land within 1 year period. Highest amount of NO₃⁻-N was observed in urea and least in Azolla. Highest nitrate leachate was recorded in Azolla when compared with other green manures. Like urea Azolla had quick mineralization of nitrogen and had low C/N ratio than other green manures. Azolla can be cultivated in paddy land to improve soil nitrogen level as there is hard pan to reduce nitrogen leachate compare to high land paddy cultivation and reduced the CO₂ from atmosphere. Rate of mineralization was high in Azolla like urea as C/N ratio in low (6.2). Use of Azolla in paddy field could minimize the usage of inorganic fertilizer and CO₂ concentration in atmosphere. By enhancing Azolla cultivation in wet land paddy field of Sri Lanka, 509, 422 tonnes of carbon dioxide (CO₂) can be reduced from atmosphere and can get 8934 tonnes of nitrogen fertilizers every year.

Key words: Azolla, carbon sequestration, global warming, nitrogen fixation, mineralization.