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Effect of Water Sources on the Growth Performance and Chlorophyll Content of *Azolla pinnata* R.Br.

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Abstract

Azolla pinnata R.Br. is an aquatic fern that grows on the surface of water bodies. The unique quality of *A. pinnata* is its symbiotic relationship with a prokaryotic cyanobacterium (*Anabaena azollae*), which confers a high rate of nitrogen fixation. It is important to find the growing conditions of *Azolla* in different water sources for its optimum biomass production for different usages such as biofertilizers, animal feeds, water purification and biofuel production. This preliminary study was conducted to investigate the effect of water sources on the growth performance (shoot biomass, root biomass, root length), and the chlorophyll content of *Azolla*. Presence of *Anabaena* in *Azolla* fronds was monitored by light microscope and number of filaments were counted per leaflet. The experiment utilized three types of water sources (tap water as control (T1), lake water (T2) and cattle manure mixed tap water (T3), in plastic buckets with 40 cm in diameter and 25 cm in height. Each treatment was triplicated in a completely randomized design and total biomass was collected weekly. Data were statistically analyzed using Minitab 17. The highest biomass of *Azolla* was obtained in T3 from the first week until 8th week and it was higher from T1 and T2. The highest chlorophyll content was obtained in T3 (6.4 SPAD value) showed a significant difference from T1 and T2 ($p < 0.05$). The dry weight of roots and root length in T1 showed a significant difference from T2 and T3 ($p < 0.05$). The highest root length was observed as 5 cm in T1 indicating that roots may be in search of nutrients and the lowest root length was observed as 0.8 cm in T3 with high nutrient concentrations in water. The highest number of *Anabaena* was observed in the leaflet of *Azolla* fronds in T3 which in turn increase N content in *Azolla* plants. It reveals that application of cattle manure in tap water significantly affects the plant biomass and the chlorophyll content of *Azolla*. Further studies are needed to conduct in large scale growing facilities with different nutrient concentrations of water sources to find sustainable and optimum growing conditions for *Azolla* and the nutrient concentrations of the plants.

Keywords: *Azolla*, Chlorophyll, Growth performance, Water sources