

COMPARATIVE ANALYSIS OF CULTIVATION METHODS FOR ENHANCING BIOMASS YIELD AND QUALITY OF AZOLLA (*Azolla* *pinnata*) IN POND SYSTEMS

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Azolla is a nitrogen-fixing freshwater fern used as a bio-fertilizer and livestock feed. Traditional cultivation with cow dung and topsoil at the pond bottom increases cow dung mixing with the azolla harvest, reducing its animal feed quality. Hence, this study explored alternative methods to enhance azolla quality, yield, and nutrients while reducing cow dung mixing with the harvest. The research was conducted in a randomized complete block design (RCBD) with three treatments, each replicated three times. In treatment 1 (control), a mixture of topsoil and cow dung was placed directly on the pond bottom at the recommended rate. Treatment 2 used compost to replace half of the topsoil in the recommended mixture and applied directly to the bottom, while Treatment 3 used the traditional, topsoil-cow dung mixture enclosed in gunny bags placed at the pond bottom. Azolla growth, biomass yield, and protein content were measured and analyzed using ANOVA at a 95% probability level. At each harvest, samples were collected from half of the pond area (0.75 m²) for measurement. Results indicated significant differences ($p < 0.05$) in fresh and dry biomass yields among the treatments. After seven harvests, the cumulative yields for Treatment 1 were 4.28±0.59 kg (fresh weight) and 0.16±0.03 kg (dry weight), while Treatment 3 yielded 4.68±0.18 kg (fresh weight) and 0.16±0.003 kg (dry weight). Both treatments demonstrated higher biomass production compared to Treatment 2, which exhibited significantly lower yields of 1.93±0.33 kg (fresh weight) and 0.08±0.01 kg (dry weight). There were no significant differences ($p > 0.05$) across treatments regarding leaf length (11.92±1.92 mm), branching (4.47±0.69), and protein content (26.53±2.98%), suggesting that these attributes are unaffected by the cultivation method. This study concludes that enclosing the topsoil-cow dung mixture in gunny bags at the pond bottom improves azolla cultivation for quality animal feed.

Keywords: Biomass yield, Livestock feed quality, Nitrogen-fixing fern, Protein content