

Modified Low-Cost Growth Medium for Spirulina Platensis using Cow Dung Tea

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Spirulina platensis, a filamentous cyanobacterium, has garnered attention for its nutritional and potential health benefits. It has been utilized in the food, pharmaceutical, and cosmetic industries as well as in high-value products. While Zarrouk's medium is commonly used as the standard medium for *Spirulina* cultivation, its large-scale adoption is hindered by higher procurement expenses. This study aimed to develop a low-cost medium using cow dung tea for cultivating *S. platensis* biomass, derived from the anaerobic digestion of cow dung which comprises essential nutrients for *S. platensis* growth. *Spirulina platensis* was cultivated in 20 g/1L cow dung tea medium with sodium bicarbonate, sodium chloride, and urea in four different concentrations, prepared by adjusting the nitrogen sources, with three replicates (medium B, D, E, F). The algae were grown 24 hrs under illumination (3000 lux CFL bulb), and the temperature was maintained at 25±2°C inside the culture unit, with continuous shaking using an orbital shaker. Growth was monitored for 20 days, with optical density readings taken every three days at 680 nm, and chlorophyll concentration and dry weight measured every five days. Nutrient uptake (nitrogen, phosphorus) and physicochemical parameters (pH, conductivity) were also recorded to track *S. platensis* growth. Normally distributed growth data were analyzed using one-way ANOVA. After a 15-day culture period, it was found that a 50 ml jar containing 20 g/1L cow dung tea medium supplemented with 0.4 g sodium bicarbonate, 0.25 g sodium chloride, 0.01 g urea fertilizer, and 0.05 ml micronutrients (medium E) was the best low-cost alternative medium out of the four tested mediums for *Spirulina platensis*, exhibiting maximum specific growth rate ($\mu=4.5774 \pm 0.5813$), dry weight (5.036±0.405g/L), total biomass (316.307mg/L), and chlorophyll 'a' content (5.441 ± 0.26µg/ml), respectively, under laboratory conditions. It is 4.8 times more profitable and yields higher compared to Zarrouk's medium.

Keywords: *Spirulina Platensis*, Anaerobic Digestion, Cow Dung Tea Medium, Zarrouk's Medium

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