

FORMULATION OF ECO-FRIENDLY CULTURE MEDIUM FOR CULTIVATION OF *Spirulina platensis*

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ABSTRACT

Spirulina is a type of spiral shaped, multicellular, photo autotrophic microalgae. *Spirulina* is a popular organism due to its high nutritional value which grows in a variety of culture media, including those containing degraded organic and inorganic minerals. It has the potential to act as a biofertilizer, nutritional additive, livestock supplement and animal feed. However, mass production of *Spirulina* is expensive due to the high cost of culture medium. Therefore, the present study was conducted to formulate a medium using different waste materials for the cultivation of *Spirulina* and assess the biomass production and nutritional content of the biomass grown in the formulated medium. Different growing media were formulated with cow dung ash, paddy husk ash and banana pseudo stem extract. Semi mass culturing was carried out in different treatments such as Control 1(100% Zarrouk's medium- ZM), Control 2 (50% Zarrouk's medium- ZM), T1(10% Cow dung ash- CDA), T2 (10% Paddy husk ash- PHA), T3 (10% CDA + 10% PHA), T4 (25% CDA), T5 (25% PHA), T6 (25% CDA + 25% PHA), T7 (Banana pseudostem extract- B + CDA- C + PHA- H) (BCH), T8 (10% BCH), T9 (25% BCH), T10 (50% BCH), and T11 (60% BCH). Optical density, pH, dry biomass, total nitrogen, total potassium, total phosphorus, total organic carbon, chlorophyll a, chlorophyll b, carotenoids, and total chlorophyll of *Spirulina* biomass were measured by using standard methods. Data were statistically analyzed using SAS University edition. The pH of culture media was increased in all treatments throughout the growing period. Control 1, Control 2 and T5 had high biomass on first harvesting, which

were 1.04 g/L, 0.90 g/L, and 0.95 g/L respectively. At the end of 30 days, 3.12 g/L of total dry biomass was obtained from T5 while the lowest was obtained from T8 and T9 as 0.62 g/L. The highest total nitrogen, phosphorus and potassium of *Spirulina* biomass were recorded in T5 as 6.65%, 0.82% and 7.60% respectively. The highest chlorophyll a, chlorophyll b, and carotenoids of *Spirulina* were recorded in control 1 (6.25 mg/L, 5.33 mg/L, 3.72 mg/L) followed by control 2 (5.84 mg/L, 3.74 mg/L, 3.70 mg/L) and T5 (5.80 mg/L, 4.59 mg/L, 3.53 mg/L). The highest total chlorophyll content was obtained from control 1 (18.78 mg/L) followed by control 2 (16.05 mg/L) and T5 (14.38 mg/L). The highest total organic carbon was obtained from T6 (38.31%) followed by T5 (34.32%). Overall results of formulated medium T5 have a high potential to produce high *Spirulina* biomass with higher nutrient content. This study has verified that paddy husk which is an agricultural waste could be used as an ash medium for culturing *Spirulina platensis* to decrease the cost of the medium without affecting the growth of *Spirulina*.

KEYWORDS: *Spirulina*, Formulation, Organic medium, Cultivation, Biomass.

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