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PREPRATION OF MEDIA USING EXTRACT OF MUSA ACUMINATA FOR CULTIVATION OF SPIRULINA

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Abstract:

The idealization was to produce a cultivation medium for Spirulina using an extract of *Musa acuminata*. The Consuming Spirulina that had been cultivated in a synthetic medium was known to cause certain side effects such as nausea, vomiting, headache, fever, and stomach ache. The composition of the growing medium influenced the quality and safety of the Spirulina, potentially leading to adverse reactions in some individuals. *Musa acuminata*, commonly known as the banana leaf, was found to be rich in bioactive compounds, phytochemicals, and essential nutrients that contributed to various biological properties.These beneficial chemicals were present in different parts of the leaf. The leaf contained several phytochemicals such as phenolic compounds, including flavonoids, tannins, and phenolic acids, which exhibited strong antioxidant properties. Alkaloids, though present in small amounts, contributed to its medicinal value, while carotenoids like β-carotene, lutein, and zeaxanthin supported eye health and immune function. Tannins found in the peel and leaves possessed antibacterial and astringent properties.In terms of primary chemical components, *Musa acuminata* was a rich source of carbohydrates, mainly in the form of starch and sugars like sucrose, glucose, and fructose, providing a vital energy source. It contained small amounts of proteins, including essential amino acids, as well as lipids such as phytosterols, which promoted heart health. The leaf was also high in vitamins, particularly vitamin C, vitamin B6, and folate, which were essential for metabolism and immunity. Additionally, its mineral content, including potassium, magnesium, calcium, and iron, supported electrolyte balance and bone health. The extract of *Musa acuminata* was collected and processed for the preparation of the cultivation medium, and this medium was compared with BG11 medium to evaluate its effectiveness for Spirulina growth.

KeyWords: Spirulina, Organic Media, M*usa Acuminata*, BG11 Media, Crop productivity.

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Introduction:

Spirulina is a highly nutritious food, rich in iron and protein, and has been recognized as one of the best foods for the future. It is often referred to as a superfood due to its exceptional nutrient profile, which surpasses that of most other foods, plants, grains, or herbs. These nutrients make Spirulina a complete food alternative to isolated vitamin supplements.(**Robinson *et al.,* 2010**) The United Nations World Food Conference declared Spirulina as the best food for the future, and its popularity continues to grow among a wide population. Being one of nature's most nearly perfect foods, Spirulina helps boost the immune system and serves as an excellent source of immediate energy **(Mwangi *et al.,* 2008).** *Musa acuminata*, commonly known as the banana plant, is also rich in bioactive compounds, phytochemicals, and essential nutrients that contribute to various biological properties. These beneficial chemicals are found in different parts of the plant, including the fruit, peel, leaves, and roots. The plant contains several phytochemicals such as phenolic compounds, including flavonoids, tannins, and phenolic acids, which

possess strong antioxidant properties. Alkaloids, though present in small amounts, contribute to its medicinal value, while carotenoids like β-carotene, lutein, and zeaxanthin support eye health and immune function **(Baiyeri et al,. 2008).** Tannins found in the peel and leaves exhibit antibacterial and astringent properties.

Regarding its primary chemical components, *Musa acuminata* is a rich source of carbohydrates, mainly in the form of starch and sugars like sucrose, glucose, and fructose, providing a vital energy source.**(Ortiz et al,. 1998)** It contains small amounts of proteins, including essential amino acids, as well as lipids such as phytosterols, which promote heart health. Additionally, the plant is high in vitamins, particularly vitamin C, vitamin B6, and folate, which are essential for metabolism and immunity. Its mineral content, including potassium, magnesium, calcium, and iron, supports electrolyte balance and bone health **(Kueneman et al., 2002).** The banana plant also exhibits several medicinal and functional properties due to its bioactive compounds. It has strong antioxidant effects that protect cells from oxidative damage, while its antimicrobial properties make the peel and leaves effective against bacterial and fungal infections. Furthermore, the plant has anti-inflammatory benefits, aiding in the reduction of inflammation, and its sap promotes wound healing by supporting tissue repair. Additionally, its high dietary fiber and resistant starch content contribute to digestive health by promoting gut function **(Ganeshbhai et al,.2013).** Overall, *Musa acuminata* is not only a nutritious fruit but also a valuable source of phytochemicals that offer a wide range of health benefits.

However, consuming Spirulina cultivated in a synthetic medium has been associated with side effects such as nausea, vomiting, headache, fever, and stomach ache.**(Uma et al,.2008)**. The composition of the growing medium plays a crucial role in determining the quality and safety of Spirulina, potentially leading to adverse reactions in some individuals. This study focuses on the preparation of a cultivation medium using an extract of *Musa acuminata* for growing Spirulina, aiming to provide a natural and potentially safer alternative to synthetic media.

Procedure:

1.1 **PREPRATION OF MEDIA BY USING EXTRACT OF *MUSA ACUMINATA:***

The process began with the collection of fresh leaf samples from the plant. These leaves were then carefully washed with distilled water to eliminate any dirt, dust, or other contaminants that might be present. To maximize the efficiency of the extraction process, the washed leaves were chopped into smaller pieces, thus increasing the surface area available for solvent interaction. These chopped leaves were then placed in a hot air oven, which was set to a temperature of 60°C, and left to dry completely.

Once the leaves were thoroughly dried, they were transferred to a Soxhlet apparatus, a specialized piece of equipment designed for solvent extraction. Water, selected as the appropriate solvent for this particular extraction, was added to the apparatus. The Soxhlet apparatus was then heated to 60°C. This heating caused the water to vaporize and rise into a condenser, where it cooled and condensed back into liquid form. The condensed water then dripped down into the extraction chamber, which contained the dried leaf sample. The solvent repeatedly cycled through the sample, dissolving and extracting the desired compounds. This process was allowed to continue for three to four cycles to ensure that the extraction of the target compounds from the leaf material was as complete as possible. Finally, the extract, now rich in the extracted compounds, was collected. This extract was then placed in a hot air oven, again set to 60°C, to evaporate any remaining water and moisture. This final drying step resulted in a dry, powdered extract, ready for further analysis or use.

1.2 Comparative study between Bg11 media's OD value and Banana leaf media in Spirulina cultivation

The 30 grams of banana leaf medium was diluted with 20 liters of distilled water in a sterile fermentation tank, and 30 grams of BG11 medium was diluted with 20 liters of distilled water in another sterile fermentation tank. Then,

20 ml of sterile *Spirulina* culture was inoculated, and the mixture was incubated at normal room temperature in direct sunlight for better growth.

Results and Discussion:

Table-1: Growth comparison between Bg11 media's OD value and Banana leaf media's OD value

days	Bg11 OD value	Banana leaf media OD value
Day 1	0.156	0.137
Day 4	0.213	0.196
Day 8	0.258	0.254
Day 12	0.285	0.291
Day 16	0.312	0.362
Day 20	0.355	0.395

The growth of Spirulina was observed over 20 days in two different media: BG11 and banana leaf extract medium. During the initial growth phase, BG11 exhibited a slightly higher OD value (0.156) compared to the banana leaf medium (0.137), indicating better initial growth. By Day 4, both media showed an increase in OD values, with BG11 at 0.213 and the banana leaf medium at 0.196, maintaining a slight advantage. By Day 8, during the mid-growth phase, the banana leaf medium had nearly caught up with BG11, with OD values of 0.254 and 0.258, respectively, suggesting that the natural medium was effectively supporting growth. On Day 12, the OD value of the banana leaf medium (0.291) surpassed that of BG11 (0.285), indicating that it was now providing better growth support. This trend continued on Day 16, with the banana leaf medium showing accelerated growth, achieving a significantly higher OD value (0.362) compared to BG11 (0.312). By Day 20, at the peak of the observation period, the banana leaf medium demonstrated the highest OD value (0.395), surpassing BG11 (0.355), confirming that it effectively supported superior Spirulina growth compared to the synthetic medium.

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