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Process optimization for production of biodegradable plastic from microalgae through Taguchi

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Plastics created from petroleum are extremely utilized which result in pollution (earthbound and oceanic) and tremendous amount of non-biodegradable waste generation. So, innovative work on biodegradable plastics is inescapable. Microalgae are a potential group of microorganisms capable of producing renewable bio-energy and environmental friendly materials. Few species of microalgae can accumulate polyhydroxyalkanoates (PHA), a type of biodegradable polymers. A better understanding of influential factors is critical for the successful use of microalgae cultures in commercial systems in order to maximize the production of chemical constituents, and contribute to the comprehensive utilization of the bioprecursors of microalgae. This is the main driving force towards growing more and more bioplastic demand to replace non-biodegradable petroleum plastics. There were many variables that could potentially affect the production of PHB. Five factors including the levels of glucose, nitrogen, phosphorus, iron and salinity were considered as principle influential factors. A full factorial design of two levels (2k) would involve a total of 32 experiments- most necessary replicas for the evaluation of the degree of coincidence between the results. Therefore, it selected a design Taguchi's two levels involving 16 runs random. Evaluation and characterization of the retrieved bioplastic was done. Experiments were carried out for 14 days in 500 ml Erlenmeyer flasks of that contained 300 ml of medium BG-11 at 25°C with fluorescent lamps of cold white light and with atmospheric CO_2. The maximum bioplastic of 30% was found in the culture grown under the lower glucose (1 g/l) level, lower nitrogen, zero phosphorus, 0.021 g/l of iron, higher salinity (0.5) and higher induction time of 14 days (Fig.1). This study has illustrated that the efficient utilization of microalgae for bioplastic production at optimum conditions can be viewed as viable solution for tackling the problems of bioplastic degradation and waste minimization.

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Bioenergy as an option for mitigating climate change in agriculture

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The days are not far! For the biomass derived energy to overtake fossil fuel as a key source for energy needs. Fossil fuels, blamed as the main culprit for climate change has been the main source for energy in the previous decades. The nature of influencing the climate change by fossil fuel emissions has created havoc among the farmers around the world leading to poverty and hunger. Biofuels are important because they span three of the greatest issues of our time – world industrial development; energy security and the transition to a bio-economy; and global warming. This review deals with the different types of bioenergy technologies available and their use in mitigating the climate change in agriculture.

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