ABSTRACT

The present research is concerned with the production, recovery and characterization of polyhydroxyalkanoates from locally isolated microalgae. The samples were collected from different localities of Lahore, Pakistan and were subjected to isolation. After the isolation, cells were qualitatively screened for the detection of PHAs by using 2 different dyes i.e. Sudan Black B and Nile blue A staining. Cells were further quantitatively screened for the production of PHAs. Fourteen strains of microalgae including cyanobacteria were isolated and among them MS-10, MS-8 and MS-5 isolates were confirmed for the production of PHAs. Optimization of various physico-chemical parameters to enhance the production of PHAs was evaluated. The strain MS-10 showed maximum accumulation 27.1% (w/w) of PHAs on CDW basis in 21 days of incubation under phosphorus starvation and nitrogen limited BG-11 medium at the pH 7.5, 25°C temperature, 16:8 h light: dark cycle, under white LED light with 1% acetate and 0.4% glucose as a carbon source were produced. Maximum productivity of the PHA was produced in sodium hypochlorite+ chloroform+ methanol method. The PHA extracted from MS-10 was further characterized. The adsorption bonds observed at 957.84 cm^{-1}, 1263.95 and 1726.46 cm^{-1} showed that the recovered polymer was PHA. TGA analysis showed that the extracted polymer was stable below the temperature 278°C. Surface topography of the recovered polymer was investigated by using Scanning electron microscope. The mechanical properties of the extracted PHA showed elongation to breakage ratio i.e. 2.63% estimated by UTM. The recovered PHA is an excellent substitute to petroleum based plastics due to its remarkable biodegradable and eco-friendly properties.