

**(018)****Development of An Indigenous Bacterial Consortium for Cellulase Production in Sri Lanka: A Step Towards a Greener Economy****Pathirana Arachchi, T.P.D., Hamsagi, S.K.D., Karunarathna, D.M.M.S., Perera, K.B.N., Wijerathna, P.A.K.C.\****Spectrum Institute of Science and Technology, No 05, Galle Road, Colombo 06, Sri Lanka**\*[chamara@spectrumcampus.edu.lk](mailto:chamara@spectrumcampus.edu.lk)***Abstract**

Cellulase is one of the most important enzymes which are broadly utilized in different industrial settings including the food industry, paper and pulp industry, textile industry, brewing and wine industry. However, in Sri Lanka the cellulase demand completely relies on the imported cellulase enzyme. Therefore, the present study focuses on the development of locally isolated novel bacterial consortium to produce cellulase enzymes. For the study cellulase producing bacteria were isolated from the two types of compost samples which include municipal solid waste compost in Nagoda and homemade compost collected from Alawwa. For the study, two different types of fresh compost samples were used including municipal solid waste compost and homemade compost which had the pH  $6.5\pm 0.1$ ,  $6.9\pm 0.2$  and temperature  $28.5\pm 0.1$  °C and  $29\pm 0$  °C respectively. The isolation of bacteria was carried out following the standard pour plate and streak plate assay on the nutrient agar medium and the screening of cellulase positive bacteria was carried out using Carboxymethyl Cellulose (CMC) agar medium. The best potential isolates were used to prepare the bacterial consortia (n=10) followed by the antagonistic assays and the total crude enzyme production of each consortium were evaluated based on the standard 3,5-dinitrosalicylic acid (DNS) assay. The best potential isolates were identified following the standard biochemical tests, including catalase, urease, starch hydrolysis and Gram staining to preliminary identification of the bacterial genera. Based on the results, 20 morphologically different bacterial colonies were isolated from compost samples and out of those, 6 were cellulase positive. Out of all prepared consortia (n=10), the highest cellulase activity (0.0682 U/mL) was recorded by a consortium comprising the bacteria *Actinomyces* spp., *Cytophaga* spp. and *Cellulomonas* spp. However, commercial bacterial cellulase activity levels were ranged between 1 U/mL to 5 U/mL. Therefore, optimization of the prepared consortium for cellulase enzyme production will be carried out as a further study. Based on the statistical analysis conducted using linear regression, it was revealed that the synergistic cellulase activity in which isolates are combined was significantly ( $p=0.00147$ ) greater than the single cellulase production by isolates. In contrast, the cellulase enzyme produced by this consortium is potentially suitable for the fabric and food industry in Sri Lanka as a greener approach towards the circular bio economy.

**Keywords:** *Bacterial consortium, Cellulase activity, DNS method, CMC agar method*