

RELATIONSHIP BETWEEN THE QUALITY PARAMETERS OF BIOFILM BIOFERTILIZERS AND CROP RESPONSE

L.R.T. Nuwangi¹, G. Seneviratne² and M.C.M. Zakeel¹

¹*Department of Plant Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura*

²*Microbial Biotechnology Unit, National Institute of Fundamental Studies, Hantana Road, Kandy*

Quality of biofertilizers is an important factor, which determines the success or failure of the production and the acceptance or rejection of the product by end-users. Quality of the product can be measured by one or more parameters, the most important being the crop yield. Relationship between quality parameters of biofilm biofertilizer and yield can be assessed by the yield response of the crop to biofertilizer. The study included 14 treatments of biofilm biofertilizer (14 different batches of Biofilm-T) used for tea cultivation. Plant assay, exopolysaccharide assay, biofilm pH, Fourier Transformed Infra Red (FTIR) spectroscopic analysis, colony forming units (CFUs) and soil microbial seed bank dormancy breaking count were used to determine the quality parameters. Harvests from 25 tea bushes/plot, each of which was applied with one of Biofilm-T batches, were obtained through six plucking rounds. Scaled yield and 14 quality parameters were the factors used for multiple regression analysis. According to paired t-test, the effect of Biofilm-T from first to sixth week was statistically significant ($p < 0.05$). The following equation was obtained by regression analysis.

$$\text{Total harvest (scaled)} = 6.29 + 0.09[\text{CCM48}] - 9.08[\text{SH}] - 0.06[\text{NA24}] + 3.44[\text{AM}] + 1.03[\text{SL}]$$

According to the regression equation, sum of peaks of SH region (thiol compounds) and CFUs after 24 hours in nutrient agar plates (NA24) showed negative relationship, whereas CFUs after 48 hours in combined carbon medium plates (CCM48), sum of peaks of Amide compounds (AM) and average seedling height (SL) showed positive relationship with yield ($R^2=0.83$, $p < 0.01$). The most significant parameter was CCM48 followed by sum of peaks of SH region. The CFU in CCM48 correlates with the amount of nitrogen fixing bacteria in biofertilizer and it can therefore be an important parameter to consider during the production of biofilm biofertilizer for non-legumes. Consequently, plant assay, FTIR spectroscopy and CFUs in NA and CCM media can be used as quality controlling tests for Biofilm-T.

Keywords: Biofilm biofertilizer, Exopolysaccharides, Quality parameters, Scaled yield