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Author	:	Idris Musa Tanimu, Ernesto Hernandez, Robert Thomas Bachmann
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Abstract	:	Previous researchers have sought to understand the biochemical methane potential (BMP) of lignocellulosic materials such as oil palm empty fruit bunch (OPEFB) by studying the anaerobic digestion of its structural components cellulose (CE), hemicellulose and lignin (LI). This study was aimed at further exploring how the BMP of these lignocellulose biomass components is influenced by different inoculum to substrate ratios (ISR), the use of an adapted inoculum, inoculum supernatant, standard ISO medium only and ISO medium supplemented with NaHCO₃ and vitamin B-complex as buffer and nutrient additive, respectively. Researchers have also relied on custom-made or commercially available BMP bioreactors which may not be standardized and cost-effective for most laboratories to investigate many variables in triplicate concurrently. The flexibility, quick setup and ease of use of the syringe-based bioreactor method was explored to overcome these limitations. This study examines the mesophilic BMP of OPEFB as well as xylan (XY), CE and LI. CE also served as a positive control. OPEFB, XY and CE exhibited BMPs of 258, 214 and 360 mLCH₄ gVS⁻¹ in original ISO medium. CE methane yield reached quasi-equilibrium between ISR 2 and 4. Plastic or glass-made syringe bioreactors did not affect BMP under the investigated conditions. Vitamine B-complex or NaHCO₃ addition to the ISO medium reduced the lag phase by 13.5 % and 16.2 %, respectively. The use of inoculum supernatant as medium reduced the lag phase of CE digestion by 80 %. CE achieved the greatest degree of methanation when using inoculum supernatant (89.5 %) or NaHCO₃ (90.2 %), followed by XY (56.7 %), OPEFB (48.3 %) and LI (0.4 %).