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Effect of Food to Vegetable Waste Ratio on Acidogenesis and Methanogenesis During Two-Stage Integration

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1 **Effect of Food to Vegetable Waste Ratio on Acidogenesis and Methanogenesis During Two-**
2 **Stage Integration**

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7 **Abstract**

8 The mixing ratio of food waste (FW) to vegetable waste (VW) (2:3 FW:VW~152.51 g VS and
9 2:1 FW:VW~137.03 gVS) was optimized using two-stage (LBR-UASB) experimental process
10 depending upon volatile solid (VS) load. The effect of FW to VW ratio was studied in leach bed
11 reactor (LBR) towards leachate production. Results revealed that hydrolysis rate (73.11%),
12 sCOD (3294.3 g/KgVS) and tVFA (2664 g/KgVS) yield was higher in 2:1 FW:VW ratio.
13 Acetate, propionate, lactate and methane yield for 2:3 FW:VW (420 g/KgVS, 87 g/KgVS, 180
14 g/KgVS and 226.86 ml/gVS respectively) was different from 2:1 FW:VW (340 g/KgVS, 247
15 g/KgVS, 340 g/KgVS and 218.54 ml/gVS respectively). 2:3 FW:VW ratio depicted higher VS
16 (53.96%) and COD (54.1%) removal than 2:1 FW:VW ratio 46.34% and 41.8% respectively.
17 VW addition regulated pH, restricted propionate and lactate production with enhanced
18 methanogenesis by improving acetate production in two-stage AD process which further boosted
19 process stability and efficiency.

20 **Keywords:** Anaerobic digestion, Food waste, Vegetable waste, Lactic acid, Rate kinetics,
21 Methanogenesis

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