Table 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Design parameters** | | **Algal community** | **Test conditions** | | **Influent concentration  (mg.L-1)** | | | **Removal efficiency (%);**  **Uptake rate  (mg.m-2.d-1)** | | | **Biomass production (g.m-2.d-1) dry weight** | **References** |
| **Substrata;**  **Area (m2)** | **HRT (d);**  **Flow velocity (m3.d-1);**  **Depth (m)** | **Test waters;**  **Temp (oC);**  **pH** | **Irradiance (µmol.m-2.s-1)a** | | **NH4+** | **TP** | **NH4+** | **TP** | |
| **FLOWAY** | | | | | | | | | | | | |
| Floway periphyton scrubber: plastic sheets  11.5 | --  128  0.001-0.003 | *Cladophora crispata, Enteromorpha micrococca, Stigeoclonium tenue, Cladphora* sp, *Spirogyra rivularis, Dichotomosiphon tuberosus, Eunotia pectinalis, Melsoria varians, Oscillatoria subbrevis, Cosmospogan coeruleus* | Agricultural run-off  18.1-27.2  7.7 | -- | | -- | 0.058 | -- | | 17.0  124 | 21.2 | (Adey et al., 1993) |
| Serial periphyton scrubber: plastic sheets  2.7 | --  37  -- | Agricultural run-off  18.1-27.2  7.7 | -- | | -- | 0.038 | -- | | 15.2  102 | 21.6 | (Adey et al., 1993) |
| Algal Turf Scrubber Single Floway  1012 | --  436-1226  0.02-0.04 | *Oscillatoria, Navicula* sp*. Nitzschia* sp*., Cyclotella* sp*., Ulothrix* sp*.,*  *Cladophora* sp*., Microspora* sp*.* | Secondary effluent  18.9  8.4 | -- | | 3.3 | 3.1 | 24.2  1,110a | | 45.2  730 | 35.0 | (Craggs et al., 1996a; Craggs et al., 1996b; Craggs, 2001) |
| Flow lanes  0.0048 | 3  --  -- | Community sampled from sedimentation tank | Modified BG11  20-30  -- | 15-120 | | -- | -- | -- | | --  0.3-119.9 | 0.17-29.0 | (Guzzon et al., 2008) |
| PVC sheet flow cell  1.8 | 0.006  0.0004-0.007  0.02 | *Nitzchia* and green filamentous | Synthetic wastewater  22  7.0 | 230 | | -- | -- | -- 1d | | --  130 | -- | (Boelee et al., 2011) |
| Unglazed pre-soaked quarry tiles  12.2 | --  --  0.005-0.01 | *Characium pringsheimii; Oedogonium; Palmellopsis gelatinosa; Pseudopleurococcus* sp*; Scensdesmus quadrucauda; Stigeoclonium; Ulothrix* plus other cyanobacteria and diatoms | Secondary effluent  11.9 -- | 270.3 g.cal.cm-2.d-1 | | -- | -- | --  1,903b | | --  157 | 130 g.m-2 | (Davis et al., 1990a; Davis et al., 1990b) |
| Plastic mesh *(Periphyton-fish system)*  48 | -- | -- | Secondary effluent  --  -- | -- | | -- | -- | 82c  108c | | 23  27 | -- | (Rectenwald and Drenner, 2000) |
| **SUBSTRATE SUBMERSION** | | | | | | | | | | | | |
| Rotating Algal Biofilm Reactor (RABR)  4.26 | 12  16.4  0.9 | *Diatoma, Pediastrum, Chlorella* sp | Wastewater effluent  11.8  -- | 208 | | 7.8 | 4.5 | --  14,100 | | --  2,100 | 31.0 | (Christenson and Sims, 2012) |
| Polyurethane foam  0.00045 | --  0.5 L.L-1.d-1  0.26 | *Chlorella* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 66.9  -- | | 64.1e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  1 L.L-1.d-1  0.26 | *Chlorella* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 62.8  -- | | 60.3e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  1.5 L.L-1.d-1  0.26 | *Chlorella* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 59.5  -- | | 57.6e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  2.0 L.L-1.d-1  0.26 | *Chlorella* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 52.6  -- | | 51.5e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  2.5 L.L-1.d-1  0.26 | *Chlorella* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 47.2  -- | | 48.0e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  2.5 L.L-1.d-1  0.26 | *Chlorella* sp. | Pre-treated cattle manure  -- | 265-372a | | 237.0 | 34.0b | 58.2  -- | | 55.4e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  0.5 L.L-1.d-1  0.26 | *Scenedesmus* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 60.6  -- | | 59.2e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  1 L.L-1.d-1  0.26 | *Scenedesmus* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 58.6  -- | | 57.8e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  1.5 L.L-1.d-1  0.26 | *Scenedesmus* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 54.5  -- | | 53.2d  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  2.0 L.L-1.d-1  0.26 | *Scenedesmus* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 48.5  -- | | 48.3e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  2.5 L.L-1.d-1  0.26 | *Scenedesmus* sp. | Pre-treated cattle manure  -- | 53a | | 237.0 | 34.0b | 42.0  -- | | 44.0e  -- | -- | (Travieso et al., 1996) |
| Polyurethane foam  0.00045 | --  2.5 L.L-1.d-1  0.26 | *Scenedesmus* sp. | Pre-treated cattle manure  -- | 265-372a | | 237.0 | 34.0b | 53.4  -- | | 50.8e  -- | -- | (Travieso et al., 1996) |
| Polystyrene foam  0.0136 | 6  Batch  -- | *Chlorella* sp.  Initial growth | Dairy manure wastewater  20  -- | 110-120 | | 309 | 770 | 94.3  -- | | 73.4  -- | 4.3 | (Johnson and Wen, 2010) |
| Polystyrene foam  0.0136 | 10  Batch  -- | *Chlorella* sp.  Initial growth | Dairy manure wastewater  20  -- | 110-120 | | 309 | 770 | 97.0  -- | | 90.0  -- | 2.6 | (Johnson and Wen, 2010) |
| Polystyrene foam  0.0136 | 15  Batch  -- | *Chlorella* sp.  Initial growth | Dairy manure wastewater  20  -- | 110-120 | | 309 | 770 | 98.7  -- | | 93.0  -- | 1.7 | (Johnson and Wen, 2010) |
| Polystyrene foam  0.0136 | 6  Batch  -- | *Chlorella* sp.  Re-growth | Dairy manure wastewater  20  -- | 110-120 | | 309 | 770 | 97.1  -- | | 76.6  -- | 4.3 | (Johnson and Wen, 2010) |
| Polystyrene foam  0.0136 | 10  Batch  -- | *Chlorella* sp.  Re-growth | Dairy manure wastewater  20  -- | 110-120 | | 309 | 770 | 99.9  -- | | 70.8  -- | 2.6 | (Johnson and Wen, 2010) |
| Polystyrene foam  0.0136 | 15  Batch  -- | *Chlorella* sp.  Re-growth | Dairy manure wastewater  20  -- | 110-120 | | 309 | 770 | 99.9  -- | | 62.3  -- | 1.7 | (Johnson and Wen, 2010) |
| Radial flexibility PVC fillers  -- | 6  Batch  0.8 | *Chlorella pyrenoidosa, Scenedesmus obliquus, Anabaena flosaque, Microcystis aeruginosa* | Artificial wastewater  24-29  8.0 | 47a | | 18.2 | 10.4 | 91.9  -- | | 98.2  -- | -- | (Wei et al., 2008) |
| Radial flexibility PVC fillers  -- | 24  0.005  0.8 | Artificial wastewater  24-29  8.0 | 47a | | 12.3 | 9.0 | 82.4  -- | | 95.4  -- | -- | (Wei et al., 2008) |

a Irradiance units converted to µmol.m-2.s-1 using conversion guidelines within (Thimijan and Heins, 1983)  
b Total Kjeldahl Nitrogen(TKN)   
c Total Nitrogen  
d Nitrate   
e Orthophosphate