**Pre-test of tubing materials**

To identify the most suitable tubing material, a pre-test was conducted. To this end, different materials were selected, namely PU (black and transparent), silicone, Tygon (E3603), rubber, FKM (recommended by Hartmann et al. 2018), PE (LDPE), PTFE, and PVC (Fig. S1, Table S1). Tubing sections of 25 cm length were used to create tubing loops (mostly by push-in connectors). These loops were partially filled with 0.5 mL of water and placed in an oven (duplicates or triplicates). Here, a diurnal temperature regime (21-31°C; monitored with log32TH loggers by Dostmann electronic, Wertheim, Germany) was simulated for one week. Water losses were determined gravimetrically.

**Figure S1: Setup of the pre-test of tubing materials.**

Although the tubing loops had nearly identical dimensions (lenghts, inner diameters, wall thicknesses), the recorded mass losses differed substantially. While the loops made of LDPE and PTFE (IDs 7 and 8) showed no measurable mass losses after one week, the silicone loops (ID 3) lost 0.35 and 0.36 g of water. These results highlight the importance of the tubing material in terms of diffusive water vapor fluxes and demonstrate the superiority of LDPE and PTFE among the tested materials. Given that LDPE is cheaper than PTFE (by a factor of 10), we selected this tubing material for our automatic rain sampler.

**Table S1: Results of the pre-test of tubing materials.**

| Loop ID | Description | Supplier | Approx. price [€/m] | Dimensions (Inner diameter x wall thickness) [mm] | Total mass at first day [g] | Total mass after 7 days [g] | Mass loss Δm after 7 days [g] |
|---|---|---|---|---|---|---|---|
| 1a | PU (black) | Landefeld | 0.79 | 4 x 1 | 10.69 | 10.54 | 0.15 |
| 1b | PU (black) | Landefeld | 0.79 | 4 x 1 | 10.79 | 10.63 | 0.16 |
| 2a | PU (transparent) | Landefeld | 0.79 | 4 x 1 | 10.90 | 10.75 | 0.15 |
| 2b | PU (transparent) | Landefeld | 0.79 | 4 x 1 | 10.81 | 10.68 | 0.13 |
| 3a | Silicone | häberle | 3.40 | 4 x 1 | 10.66 | 10.30 | 0.36 |
| 3b | Silicone | häberle | 3.40 | 4 x 1 | 10.66 | 10.31 | 0.35 |
| 4a | Tygon E3603 | häberle | 3.05 | 4 x 0.8 | 5.27 | 5.02 | 0.25 |
| 4b | Tygon E3603 | häberle | 3.05 | 4 x 0.8 | 5.27 | 5.06 | 0.21 |
| 4c | Tygon E3603 | häberle | 3.05 | 4 x 0.8 | 5.28 | 5.03 | 0.25 |
| 5a | Rubber | häberle | 4.30 | 4 x 1 | 11.10 | 11.06 | 0.04 |
| 5b | Rubber | häberle | 4.30 | 4 x 1 | 9.41 | 9.36 | 0.05 |
| 6a | FKM | häberle | 13.30 | 4 x 1 | 12.33 | 12.31 | 0.02 |
| 6b | FKM | häberle | 13.30 | 4 x 1 | 10.77 | 10.75 | 0.02 |
| 6c | FKM | häberle | 13.30 | 4 x 1 | 10.68 | 10.66 | 0.02 |
| 7a | PE (LDPE) | häberle | 1.30 | 4 x 1 | 9.20 | 9.20 | 0.00 |
| 7b | PE (LDPE) | häberle | 1.30 | 4 x 1 | 7.59 | 7.59 | 0.00 |
| 7c | PE (LDPE) | häberle | 1.30 | 4 x 1 | 7.57 | 7.56 | 0.01 |
| 8a | PTFE | häberle | 14.10 | 4 x 1 | 14.06 | 14.06 | 0.00 |
| 8b | PTFE | häberle | 14.10 | 4 x 1 | 12.41 | 12.41 | 0.00 |
| 8c | PTFE | häberle | 14.10 | 4 x 1 | 14.21 | 14.21 | 0.00 |
| 9a | PVC | häberle | 1.35 | 4 x 1 | 9.65 | 9.61 | 0.04 |
| 9b | PVC | häberle | 1.35 | 4 x 1 | 9.74 | 9.70 | 0.04 |
| 9c | PVC | häberle | 1.35 | 4 x 1 | 9.66 | 9.62 | 0.04 |

PU: Polyurethane

LDPE: Low-density polyethylene

PTFE: Polytetrafluoroethylene

PVC: Polyvinyl chloride

**Further details on the evaporation experiment in the laboratory oven**

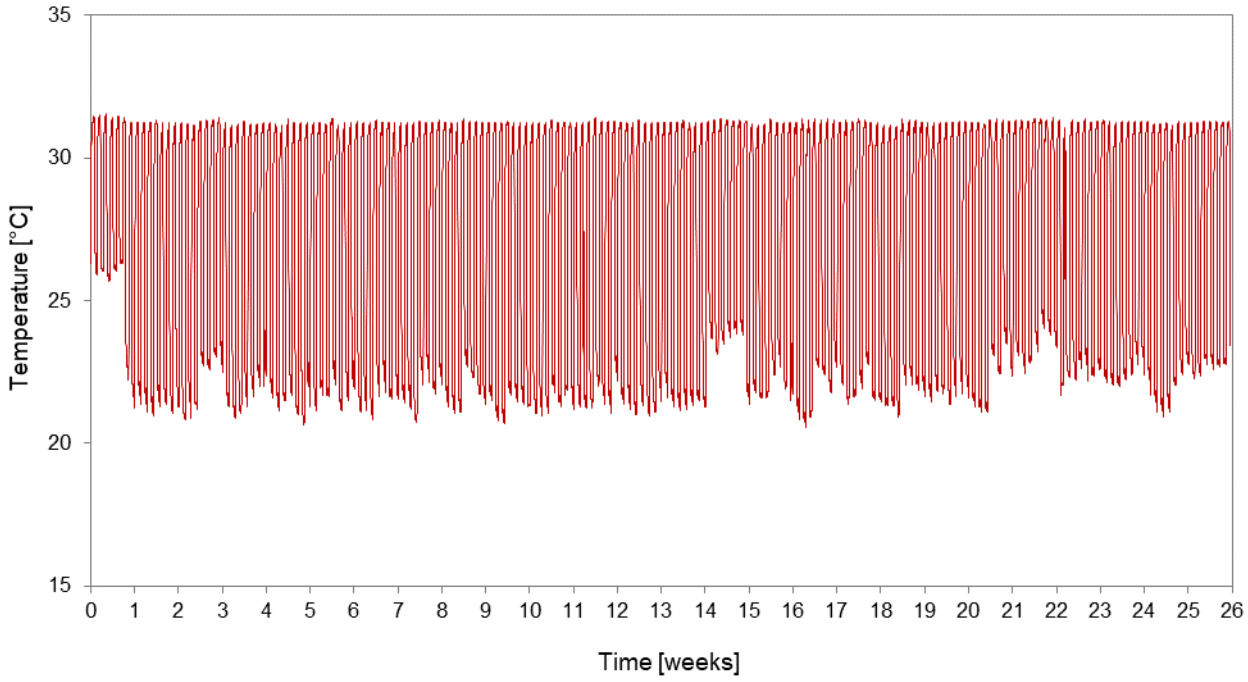


**Figure S2: Temperatures during the evaporation experiment in the laboratory oven ($T_{mean}$=26.7°C). Note the diurnal regime with simulated nighttime and daytime temperatures of approx. 21°C and 31°C. Anomalies in the nighttime temperatures are caused by occasional technical problems with the airconditioning system of the laboratory.**

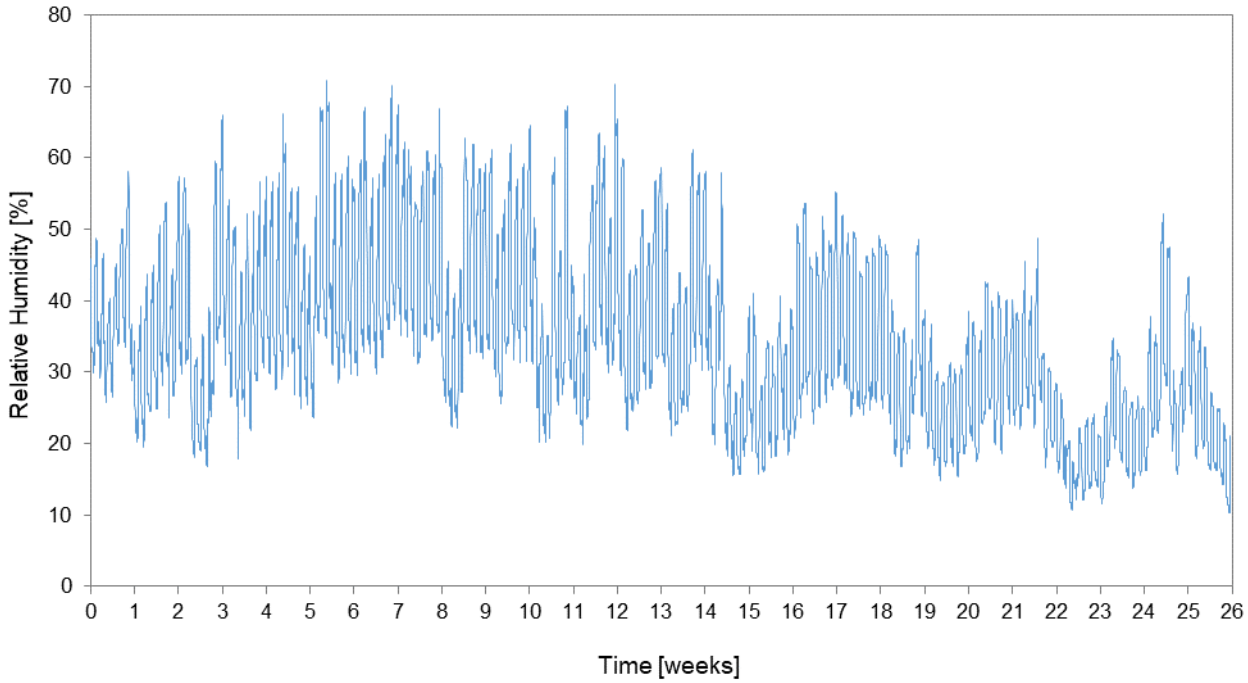


**Figure S3: Relative humidities during the evaporation experiment in the laboratory oven ($RH_{mean}$=34.4 %).**

**Table S2: Absolute masses and mass losses of the three identical tubing loops (LDPE; 25 cm) during the evaporation experiment. Initially, all loops contained 0.5 mL of water.**

| Loop ID | Total mass at first day [g] | Total mass after 6 weeks [g] | Mass loss Δm after 6 weeks [g] | Total mass after 16 weeks [g] | Mass loss Δm after 16 weeks [g] | Total mass after 26 weeks [g] | Mass loss Δm after 26 weeks [g] |
|---|---|---|---|---|---|---|---|
| 1 | 7.56 | 7.53 | 0.03 | 7.47 | 0.09 | 7.41 | 0.15 |
| 2 | 7.47 | 7.44 | 0.03 | 7.38 | 0.09 | 7.33 | 0.14 |
| 3 | 7.53 | 7.50 | 0.03 | 7.44 | 0.09 | 7.39 | 0.14 |