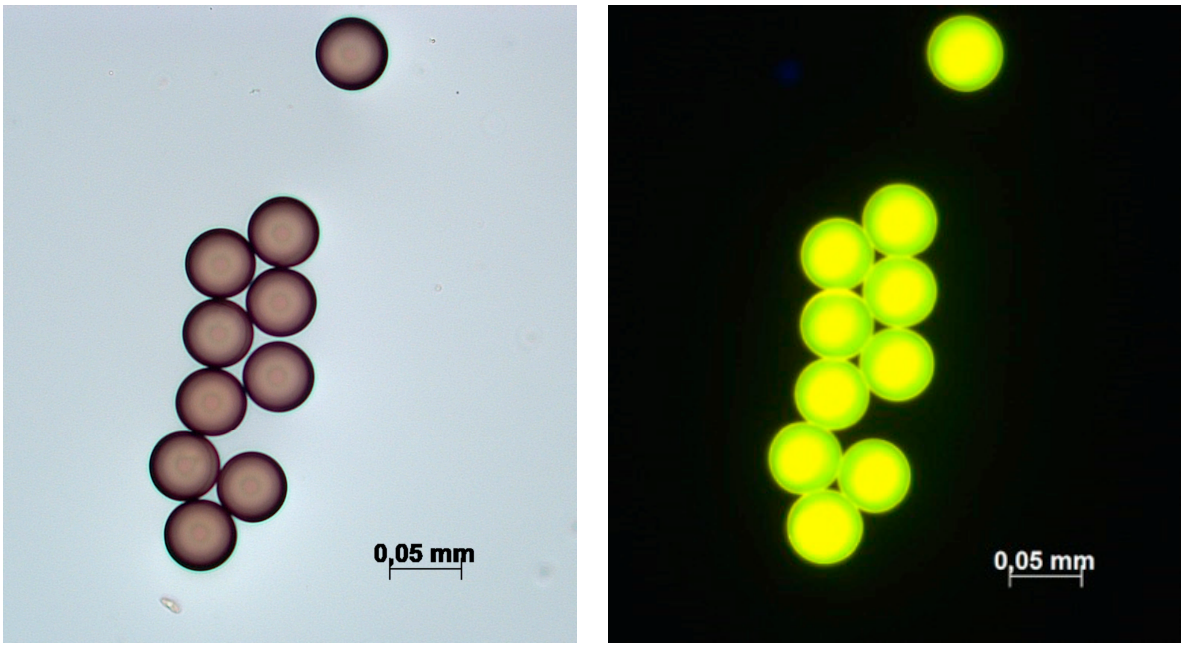


**Figure S1.** Spherical PS particles (PS-FluoRot-50, mean diameter 48.2 µm, microParticles GmbH, Berlin, Germany). (a) bright-field image and (b) corresponding fluorescence image (DAPI).

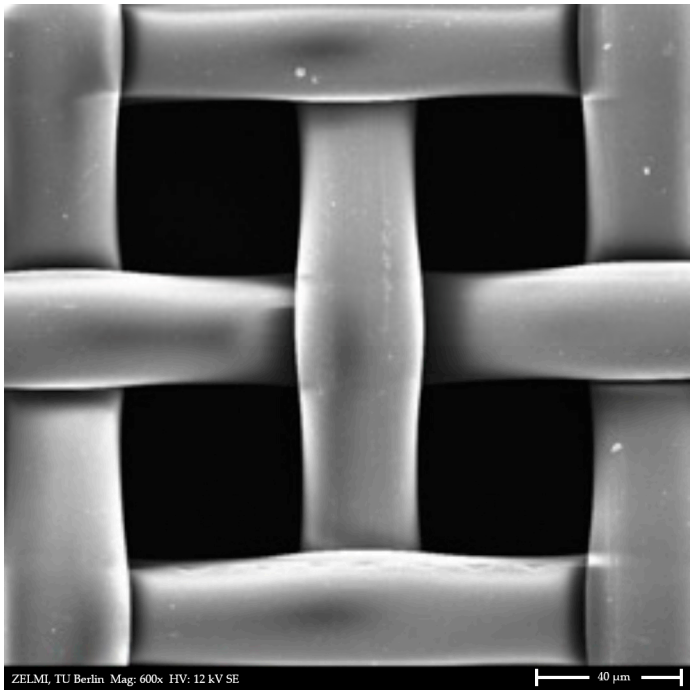


**Figure S2.** Image obtained by scanning electron microscopy of the micro-sieve used for particle fractionation.

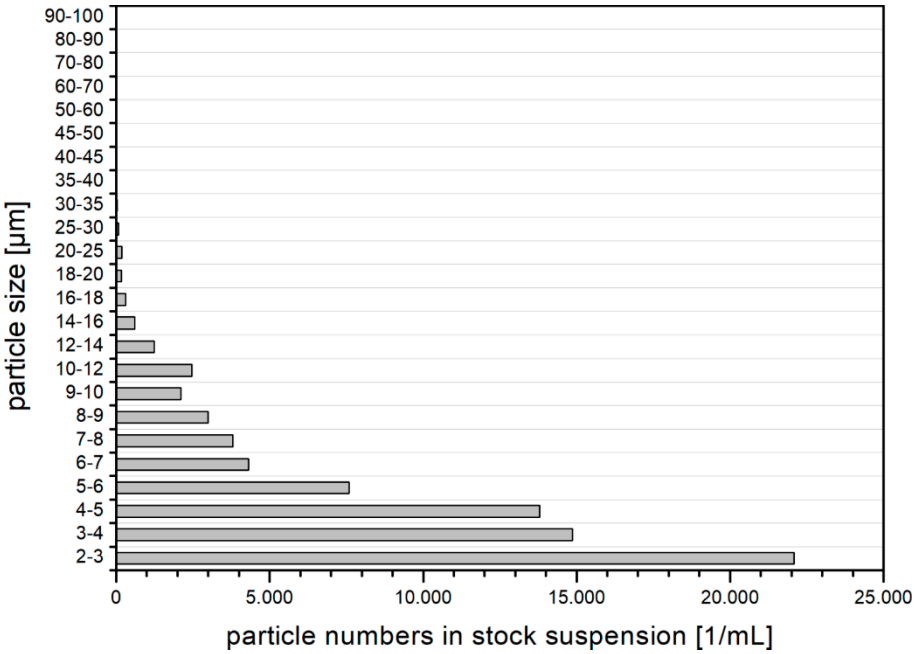


**Figure S3.** Particle numbers and size distribution in an exemplary stock suspension.

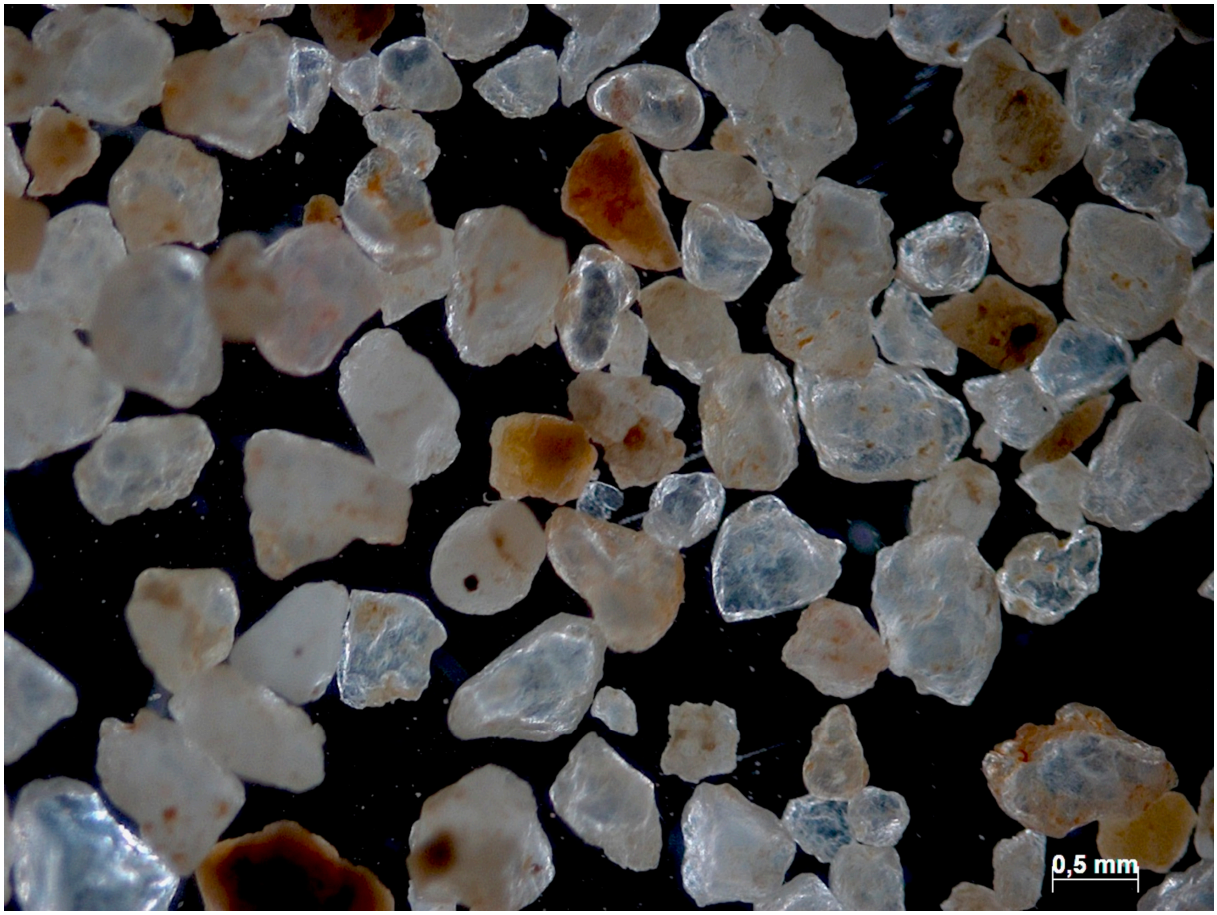


**Figure S4.** Microscopic image of quartz sand used as test sediment.

**Table S1.** Experimental design and mortality of different test runs at each timepoint in percent

| test run | treatment | n | 24 h | 48 h | 72 h | 96 h |
|---|---|---|---|---|---|---|
| #1 | control | 61 | 3.28% | 6.56% | 6.56% | 8.20% |
| | PS 150,000 | 60 | 5.00% | 6.67% | 6.67% | 6.67% |
| | PS 1,000,000 | - | - | - | - | - |
| | MIX 150,000 | 60 | 6.67% | 6.67% | 10.00% | 28.33% |
| | MIX 1,000,000 | - | - | - | - | - |
| | TH | 62 | 1,61% | 1,61% | 16.13% | 45.16% |
| #2 | control | 60 | 1.67% | 5.00% | 8.33% | 8.33% |
| | PS 150,000 | 61 | 1.64% | 3.28% | 6.56% | 6.56% |
| | PS 1,000,000 | - | - | - | - | - |
| | MIX 150,000 | 60 | 0.00% | 5.00% | 11.67% | 31.67% |
| | MIX 1,000,000 | - | - | - | - | - |
| | TH | 62 | 0.00% | 9.68% | 12.90% | 33.87% |
| #3 | control | 60 | 0.00% | 0.00% | 3.33% | 8.33% |
| | PS 150,000 | 60 | 1.67% | 1.67% | 1.67% | 1.67% |
| | PS 1,000,000 | 60 | 0.00% | 0.00% | 3.33% | 3.33% |
| | MIX 150,000 | 61 | 1.64% | 3.28% | 11.48% | 40.98% |
| | MIX 1,000,000 | 60 | 1.67% | 3.33% | 28.33% | 55.00% |
| | TH | 61 | 0.00% | 0.00% | 18.03% | 52.46% |
| #4 | control | 60 | 0.00% | 1.67% | 6.67% | 8.33% |
| | PS 150,000 | 60 | 0.00% | 0.00% | 1.67% | 5.00% |
| | PS 1,000,000 | - | - | - | - | - |
| | MIX 150,000 | 180 | 5.00% | 8.89% | 17.78% | 32.78% |
| | MIX 1,000,000 | - | - | - | - | - |
| | TH | 180 | 6.11% | 11.11% | 27.22% | 45.00% |
| #5 | control | 247 | 1.21% | 1.21% | 1.62% | 3.24% |
| | PS 150,000 | 123 | 0.00% | 0.81% | 0.81% | 2.44% |
| | PS 1,000,000 | - | - | - | - | - |
| | MIX 150,000 | 122 | 3.28% | 8.20% | 18.03% | 45.90% |
| | MIX 1,000,000 | - | - | - | - | - |
| | TH | 244 | 4.51% | 7.79% | 26.23% | 58.61% |
| #6 | control | 51 | 0.00% | 0.00% | 0.00% | 0.00% |
| | PS 150,000 | 50 | 0.00% | 0.00% | 0.00% | 0.00% |
| | PS 1,000,000 | 51 | 0.00% | 0.00% | 1.96% | 1.96% |
| | MIX 150,000 | 50 | 0.00% | 2.00% | 2.00% | 8.00% |
| | MIX 1,000,000 | 50 | 0.00% | 4.00% | 6.00% | 28.00% |
| | TH | 50 | 2.00% | 6.00% | 14.00% | 42.00% |
| #7 | control | 50 | 0.00% | 0.00% | 0.00% | 2.00% |
| | PS 150,000 | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | PS 1,000,000 | 50 | 0.00% | 0.00% | 0.00% | 0.00% |
| | MIX 150,000 | 52 | 1.92% | 3.85% | 7.69% | 30.77% |
| | MIX 1,000,000 | 51 | 1.96% | 7.84% | 11.76% | 35.29% |
| | TH | 50 | 4.00% | 6.00% | 6.00% | 22.00% |

**Table S2.** Burrowing behavior; percentage of living larvae burrowed at the respective time points.

| test run | treatment | 24 h | n | 48 h | n | 72 h | n | 96 h | n |
|---|---|---|---|---|---|---|---|---|---|
| #5 | control | 58.20% | 122* | 57.63% | 118* | 76.27% | 236 | 66.81% | 229 |
| | PS 150,000 | - | - | - | - | 95.90% | 122 | 87.50% | 120 |
| | PS 1,000,000 | - | - | - | - | - | - | - | - |
| | MIX 150,000 | - | - | - | - | 26.00% | 100 | 13.43% | 67 |
| | MIX 1,000,000 | - | - | - | - | - | - | - | - |
| | TH | 37.07% | 116* | 17.12% | 111* | 5.26% | 171 | 2.15% | 93 |
| #6 | control | 100.00% | 51 | 92.16% | 51 | 90.00% | 50 | 76.00% | 50 |
| | PS 150,000 | 90.00% | 50 | 94.00% | 50 | 96.00% | 50 | 86.00% | 50 |
| | PS 1,000,000 | 90.20% | 51 | 84.31% | 51 | 100.00% | 50 | 80.00% | 50 |
| | MIX 150,000 | 86.00% | 50 | 73.47% | 49 | 52.08% | 48 | 40.91% | 44 |
| | MIX 1,000,000 | 94.00% | 50 | 83.33% | 48 | 55.32% | 47 | 28.57% | 35 |
| | TH | 79.59% | 49 | 36.17% | 47 | 9.52% | 42 | 0.00% | 28 |
| #7 | control | 86.00% | 50 | 93.88% | 49 | 87.76% | 49 | 63.83% | 47 |
| | PS 150,000 | - | | - | | - | | - | |
| | PS 1,000,000 | 94.00% | 50 | 91.67% | 48 | 91.67% | 48 | 47.92% | 48 |
| | MIX 150,000 | 78.43% | 51 | 40.82% | 49 | 27.08% | 48 | 8.33% | 36 |
| | MIX 1,000,000 | 76.00% | 50 | 59.57% | 47 | 35.56% | 45 | 47.92% | 33 |
| | TH | 85.11% | 47 | 53.33% | 45 | 14.29% | 42 | 8.33% | 36 |

* at 24 h and 48 h burrowing behavior was only noted at half of the vials of control and TH treatment

Determination of thiacloprid via LC-MS/MS

Chromatographic separation was achieved by application of a PerkinElmer Series 200 LC (PerkinElmer, Waltham, USA), consisting of two Series 200 Micro Pumps, a Series 200 vacuum degasser, and a Series 200 autosampler. The LC-system was coupled to a QqLIT mass spectrometer SCIEX QTRAP 3200 (AB SCIEX, Darmstadt, Germany). Ionization was achieved

via electrospray ionization in positive mode. Further important MS parameter are listed in Table S3.

**Table S3.** ESI-parameter for LC-MS/MS analysis of thiacloprid

| **Parameter** | **Value** |
|---|---|
| **Ion source (ESI) temperature** | 400 °C |
| **Capillary voltage (positive ion mode)** | 5500 V |
| **Curtain gas (CUR)** | 1.7 bar (25 psi) |
| **Nebulizer gas (GS 1)** | 2.8 bar (40 psi) |
| **Turbo gas (GS 2)** | 3.4 bar (50 psi) |
| **CAD gas** | Medium (5 on a scale from 1 to 12) |
| **Interface heater (ihe)** | On |

Separation was performed at 23 °C using a XSelect™ HSS T3 reverse phase column (2.1 mm x 50 mm, 3.5 µm particle size) from Waters (Milford, USA). The injection volume was 10 µL and a gradient method was applied at a flow rate of 200 µL $min^{-1}$. Eluents used for chromatographic separation were mixtures of water and methanol (A: MeOH/$H_2O$, 5:95, v/v; B: MeOH/$H_2O$, 95:5, v/v) both containing 5 mM $L^{-1}$ ammonium formate ($NH_4Fo$) and adjusted to pH 3. Table S4 displays the chromatographic gradient used for LC-MS/MS measurements.

**Table S4.** Chromatographic gradient for LC-MS/MS analysis of thiacloprid

| **Total time [min]** | **Eluent A [%]** |
|---|---|
| **0** | 95 |
| **1.0** | 95 |
| **3.0** | 5 |
| **7.0** | 5 |
| **7.1** | 95 |
| **14** | 95 |

Based on optimized MS parameters an MRM method was developed and the respective parameter and values stated in Table S5. The transition of m/z 253 → 126 was used as quantifier for thiacloprid.

**Table S5.** MS settings used for the analysis of thiacloprid. Transitions used as quantifier are stated in bold.

| **Compound** | **Q1 mass** *m/z* | **Q3 mass** *m/z* | **DP** **in V** | **EP** **in V** | **CE** **in V** | **CXP** **in V** |
|---|---|---|---|---|---|---|
| **Thiacloprid** | **253** | **126** | 35 | 8 | 32 | 5 |
| | 253 | 99 | 35 | 8 | 60 | 4 |
| **Atrazine** | **216** | **174** | 35 | 5 | 25 | 5 |
| **(IStd)** | 216 | 104 | 35 | 5 | 40 | 5 |

Analysis of sorption behavior of thiacloprid to PS

Sorption isotherms were determined for each concentration level in duplicates. Therefore, ten different concentrations levels ranging from 1 to 1000 ng/mL were prepared. For each concentration level 10 mg (± 2 mg) of the PS were accurately weighed into a 22.5 mL glass vessel with screw cap and Teflon septa and exact polymer weights were noted. Synthetic freshwater was added to the PS particles and after an 24 h incubation thiacloprid was spiked to reach respective initial concentrations. Incubation of samples was performed at room temperature and under exclusion of light on an orbital shaker for 30 days. (Prior experiments indicated that incubation of 30 days is sufficient to reach steady state.) Sorption to glass containers was corrected by preparation of process blanks, which were treated identically, but did not contain any polymer particles.

After incubation a liquid/liquid extraction of the aqueous phase was performed to determine the concentration of thiacloprid in the aqueous phase. Diethyl ether, containing atrazine (IStd) at 100 ng/mL was used during liquid/liquid extraction. After evaporation of diethyl ether extracts to dryness, samples were reconstituted in 1 mL MeOH/$H_2O$ (50:50, v/v) and after filtration through 0.2 µm syringe filters ready for LC-MS/MS analysis.