

Supplementary information

Supporting Table and Figure legends

Table S1. Composition of Standard Snail Water (SSW) used as culture medium for *P. acuta*.

Table S2. Different studies conducted on the effects microplastics on various Eco physiological attributes of freshwater invertebrates.

Supporting Figure S1. Macroplastic film with egg capsules of *P. acuta*, collected from the limnetic zone of the river Ganga, at Danapur (25°38'29.41"N, 85°02'42.17"E).



Supporting Figure S1. Macroplastic film with egg capsules of *P. acuta*, collected from the limnetic zone of the river Ganga, at Danapur (25°38'29.41"N, 85°02'42.17"E).

Table S1. Composition of Standard Snail Water (SSW) used as culture medium for *P. acuta*.

Solution code	Chemicals	Concentrations
A	CaCl ₂ .2H ₂ O (Calcium chloride dihydrate)	11.76 g dissolved in 1 L distilled water
B	MgSO ₄ .7H ₂ O (Magnesium heptahydrate)	4.93 g dissolved in 1 L distilled water
C	NaHCO ₃ (Sodium bicarbonate)	2.59 g dissolved in 1 L distilled water
D	KCl (Potassium chloride)	0.23 g dissolved in 1 L distilled water

Table S2. Different studies conducted on the effects microplastics on various Eco physiological attributes of freshwater invertebrates.

Species	Polymer	Polymer size	Concentration	Experiment duration	Parameter	Effects	References
<i>Gammarus fossarum</i>	PA and PS	(b) 500 × 20 µm of polyamide fibres (b) 1.6 µm PS beads	(a) 100, 540, 2680, (PA) 13,380 PA fibres/cm ² (b) 500, 2500, 12,500, 60,000 PS beads/mL	28 days	1-Assimilation efficiency 2-Feeding rate 3-Weight change 4-Mortality	1.(-ve) for PA, (0) for PS 2.(0) 3.(0) 4.(+ve)	[38]
<i>Caenorhabditis elegans</i>	PA, PE, PP, PA, PE, PP and PVC PVC, PS	~70 µm. PS particle, 0.1 µm, 1.0 µm and 5.0 µm.	0.5, 1.0, 5.0 and 10.0 mg/ m ²	2 days	1-Mortality 2-Body length 3-Reproduction 4-Intestinal Ca levels	1.(+ve) 2.(-Ve) 3.(-Ve) 4.(-Ve)	[61]

<i>Hyalella azteca</i>	PE and PP	10 μm to 27 μm	(a) 4.64 $\times 10^4$ microplasti cs/mL	(a) 10 days mortality	1-Mortality 2-Growth 3-Reproduction (PE) (+ve) for (PP)	1.(+Ve)	[50]
			(b) 71.43 microplastics/mL	(b) 42 days chronic		3.(-Ve)	
					bioassay		
<i>Potamopyrgus antipodarum</i>	PA, polycarbonate (PC), PS, PVC	PET, 118 \pm 105 mm	30% and 70%	56 days and 141 days	1-Mortality 2-Dimension Reproduction 4-Embryos without shell	1.(0) 3- 2.(-Ve)in juveniles 3.(0) 4.(0)	[60]
<i>Caenorhabditis elegans</i>	Nano PS	100 nm	1, 10, 100, 1000, and 10000 $\mu\text{g} / \text{L}$	4.5 days production 2-Locomotion behaviour 3-Brood size	1-Intestinal production 2-Locomotion behaviour 3-Brood size	ROS ^a 1.(+ve) 2.(-Ve) 3.(-Ve) 4-(+Ve)	[65]

4-Intestinal permeability								
[46]								
<i>Daphnia magna</i>	PET	length range: 62– 1400 µm, width 31– 528 µm, thickness 1– 21.5 µm)	12.5, 25, 50, and 100 mg/L	Standard h exposure	48 h recovery	1-Mortality toxicity	1.(+ve) 2-Growth	in pre-feeders
<i>Gammarus fossarum</i>	PMMA	(32–63 µm, 63–125 µm, and 125–250 µm)	10, 100, 1000, 10,000, 100,000 µm, and 125–250 µm)	28 days MPP /individual.	28 days	1-Feeding rate	1.(0)	[64]
<i>Chironomus tepperi</i>	PE	1–4, 10–27, 43–54 and 100–126 µm	500 sediment	particles/kg 10 days	5 days and 10 days	1-Growth	1.(-Ve) 2-Emergence rate	[66]
<i>Dreissena</i>	PS	10 µm and 1 µm	(a) 5×10^5 of 1 µm size PS microbeads /L and	6 days	6 days	1-Cellular stress	1.(0) 2-Oxidative damage	[62] 2.(+Ve) 3. (+ve)

			5×10^5 of 10 μm size (b) 2×10^6 of 1 μm size	3- PS microbeads /L, PS microbeads /L and	Neurogenotoxicity	
<i>Daphnia magna</i>	PS	2.5 to 30 μm	0, 2.1, 4.2, 6.3, 8.4 mg/ L	7 days	1-Filtration capacity	1.(-Ve) [59]
<i>Gammarus pulex</i>	PS	20-500 μm	0, 0.1, 1, 5, 10, 20, 30 and 40 % plastic and sediment mixture.	28 days	1-Mortality 2-Growth 3-Feeding rate	1.(0) 2.(-Ve) 3.(0) [63]
<i>Hyalella azteca</i>	PS	20-500 μm	0, 0.1, 1, 5, 10, 20, 30 and 40 % plastic and sediment mixture.	28 days	1-Mortality 2-Growth 3-Feeding rate	1.(0) 2.(0) 3.(0) [63]

<i>Asellus aquaticus</i>	PS	20-500 µm	0, 0.1, 1, 5, 10, 20, 30 and 40 % plastic and sediment mixture.	28 days	1-Mortality 2-Growth 3-Feeding rate	1.(0) 2.(0) 3.(0)	[63]
<i>Sphaerium corneum</i>	PS	20-500 µm	0, 0.1, 1, 5, 10, 20, 30 and 40 % plastic and sediment mixture.	28 days	1-Mortality 2-Growth 3-Feeding rate	1.(0) 2.(0) 3.(0)	[63]
<i>Lumbriculus Variegatus</i>	PS	20-500 µm	0, 0.1, 1, 5, 10, 20, 30 and 40 % plastic and sediment mixture.	28 days	1-Mortality 2-Growth 3-Feeding rate	1.(0) 2.(0) 3.(0)	[63]
<i>Tubifex spp.</i>	PS	20-500 µm	0, 0.1, 1, 5, 10, 20, 30 and 40 % plastic and sediment mixture.	28 days	1-Mortality 2-Growth 3-Feeding rate	1.(0) 2.(0) 3.(0)	[63]
<i>Physa.acuta</i>	PS	32-63 µm	20, 30 and 40 mg/200mL	93 days	1. Locomotion rate 2. Reproduction rate 3. Hatching success	1. (-Ve) 2. (-Ve) 3. (-Ve)	Present study

Abbreviations used: -Ve; negative effect, +Ve; positive effect, 0; no effect, PS; polystyrene, PE; polyethylene, PET; Polyethylene Terephthalate, PVC; polyvinylchloride, PP; polypropylene, PMMA; Polymethyl methacrylate, PA; polyamide.