

Comparison of bioassay based on the ostracod stress response: *Heterocypris incongruens* and *Candona rectangulata*

Barbara Wojtasik¹, Agnieszka Baran², Marek Tarnawski², Magda Szara², Tomasz Koniarz²

¹HydroBiolab Gdynia (hydrobiolab@wp.pl) , ²University of Agriculture in Krakow, Poland



Rożnów Reservoir

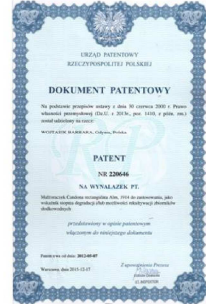
Location: Małopolska (South Poland), Dunajec river, agricultural basin.

Sources of pollution: agriculture: runoff from fields, discharges of municipal-municipal sewage.

Functions: energy, flood control, recreation.

24/09/2015

Rożnów Reservoir	
Year of completion	1941
Reservoir storage	228 (total), 139 (useful) mln m ³
Mean / max depth	4,5 / 30 m



- ISO 14371:2012 Water quality. Determination of fresh water sediment toxicity to *Heterocypris incongruens* (Crustacea, Ostracoda).
- Ostracodtoxkit F. 2001. Direct contact toxicity test for freshwater sediments. Standard operational procedure. Nazareth, Belgium, MicroBioTest Inc, 35.

Ostracodtoxkit F

A test determines mortality and growth inhibition of the *Heterocypris incongruens*.

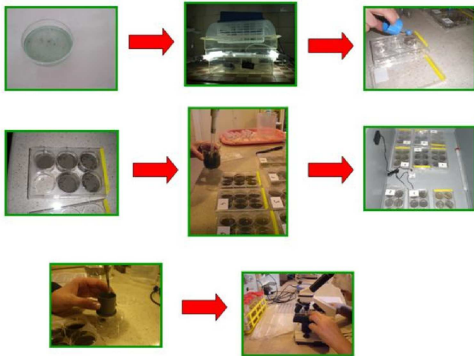


H. incongruens (author Tigret)

Heterocypris incongruens are commonly found in fresh waters on all continents

The test is carried out on a multi-well plate using young crustaceans hatched from cysts. After 6 days of residence in the sediment, their mortality and growth percentage is determined in relation to the results obtained in a control sediment.

Chronic toxicity
• incubation time 6
• temperature 25°C



The test is carried out in well plates, 6 replicates for the sample
Screening test

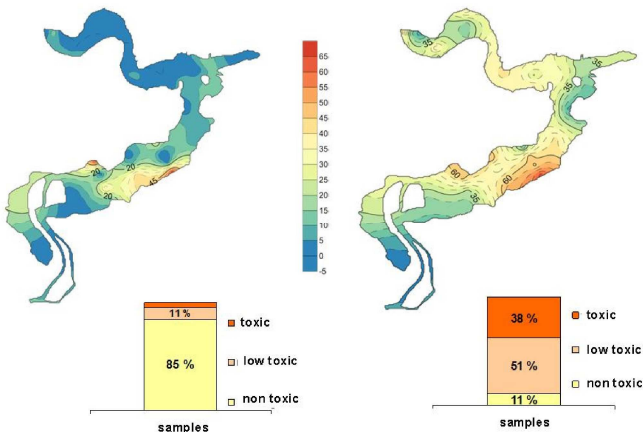
Toxicity results were expressed as Percent Effect (PE%)

- no acute toxicity PE < 20%;
- slight acute toxicity 20% ≤ PE < 50%;
- acute toxicity 50% ≤ PE < 100%;
- high acute toxicity PE ≥ 100% (all tests)

*Persoone G, (2003) A practical and user-friendly toxicity classification system with microbioassays for natural waters and wastewaters. Environ Toxicol 18(6): 395-402

Mortality of *H. incongruens* [PE %]

Growth inhibition of *H. incongruens* [PE %]



authorized

Wojtasik B. 2015. Ostracod – *Candona rectangulata* Alm, 1914 for use as an indicator of degradation and/or the possibility of restoring water reservoir. Patent No. 220646. Polish Patent Office.

CrecTest

A test based on the freshwater ostracod stress response *Candona rectangulata* Alm, 1914.



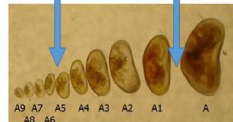
C. rectangulata, mature female (author B. Wojtasik)

species of ostracod

occurrence sensitivity to environmental factors

Arctic freshwater and salt water reservoir, littoral zone (in case of deeper lakes)
Tolerance: temperature (up to 30°C, temporarily up to 50°C), C, S, pH > 5.5, heavy metals, DDT, C₂H₅OH (up to 1%)

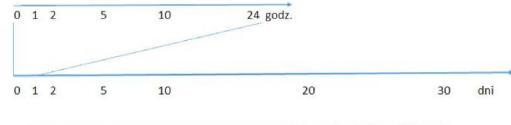
stages of development used in the test



The test uses individuals with visible very good life condition in stages A5 - A1.

conducting the experiment

Acute toxicity observations carried out for 24 hours



The test is carried out in well plates, 3 replicates for the sample

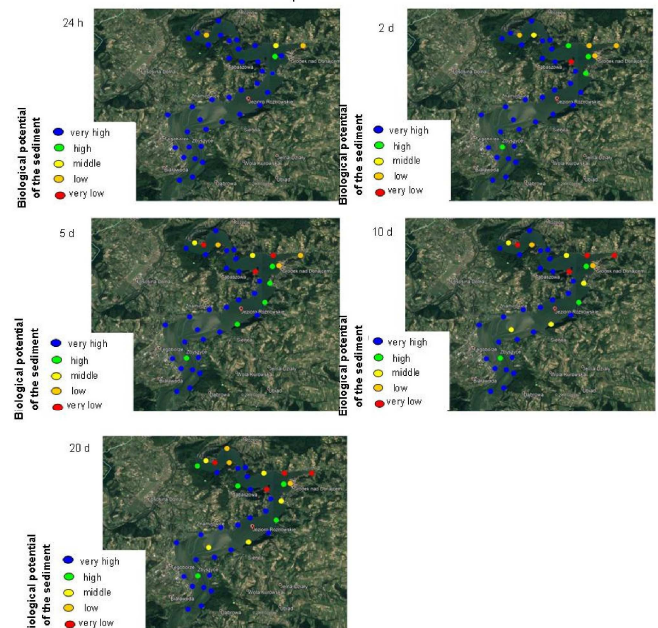
evaluation of results

Chronic toxicity observations up to 20 days (standard) up to a maximum of 30 days

A 4-stage scale is used to assess the degree of degradation of bottom sediments and / or water, which can be assigned point values:
Degradation of the water reservoir - lethal conditions for *C. rectangulata* (dead organism - 0 points)
Low biological potential of bottom sediments - *C. rectangulata* in the state of anabiosis (individual in the state of anabiosis - 2 points)
Lower biological potential of bottom sediments - low activity of *C. rectangulata* (individual with low vital activity - 5 points)
Potential possibility of self-renewal (natural remediation) - *C. rectangulata* shows normal life activity at the level of control samples under conditions of uncontaminated environment (normal activity of the individual - 10 points)

Results

A test for sediment samples from 40 littoral stations was carried out



Summary: Comparative testing of tests was carried out for the littoral zone of the Rożnowski Reservoir. The results are similar, but not identical. Exposure time ostracod was significant.

The study was financed by grant no. 2016/21/B/ST10/02127: "Assessment of the bottom sediment organic matter on bioavailability and toxicity of chemical compounds" provided by the National Science Centre, Poland