EATLAS DATA CATALOGUE (AIMS)

Toxicity of the insecticide imidacloprid to marine larvae of the hermit crab Coenobita variabilis (Arthropoda/Crustacea) (NESP TWQ 3.1.5, AIMS)

Metadata | Metadata (XML)
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Title	Toxicity of the insecticide imidacloprid to marine larvae of the hermit crab Coenobita variabilis (Arthropoda/Crustacea) (NESP TWQ 3.1.5, AIMS)
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Abstract	This dataset shows the effects of the insecticide imidacloprid on larval development of the hermit crab Coenobita variabilis. Experiments were conducted in 2017. The aim of this project was to apply a standard ecotoxicology protocol to determine the effects of the insecticide imidacloprid (that has been detected in the Great Barrier Reef catchment area (O'Brien et al., 2016)), on larval development (6-d exposures) of the hermit crab Coenobita variabilis. These toxicity data will enable improved assessment of the risks posed to marine crustaceans for both regulatory purposes and for comparison with other taxa. Methods: Imidacloprid (CAS 138261-41-3) stock solutions were prepared using PESTANAL (Merck) analytical grade product (purity greater than or equal to 99.9%). Stock solutions (100 – 1,000 mg L-1) were prepared by dissolving aliquots of the pure compound in ultrapure water using clean, acid-washed (5% nitric acid) glass screw-top containers. Acetone was used to dissolve the imidacloprid (less than or equal to 0.01 % (v/v) in exposure solutions). Stock solutions were stored refrigerated and in the dark. Tests were conducted as previously described (in van Dam et al, 2018). Broodstock crabs were collected from the Nightcliff seashore (Darwin, Australia – 12°23'8.70"S, 130°50'34.59"E) and maintained in custom-built, flat-bottomed enclosures. Spawning was left to occur naturally and toxicity tests initiated immediately following collection of larvae. Transparent polystyrene cell culture plates (Nunc; Thermo Scientific) were employed as test chambers. Each replicate plate contained six wells with a volume of 13 mL each. Exposures were conducted in a high-precision environmental chamber maintained at 29 ± 1°C, under 80 – 100 µmol quanta m-2s-1 PAR irradiance and a 12h:12h diurnal light:dark cycle. Zoeae were exposed to increasing concentrations of imidacloprid and tested against control (no toxicant) larvae. Zoeae were allocated individually to a well as larvae became cannibalistic once transitioned to megalopae. Five wells within a discrete plate contained analogous treatment solutions. Per test, a total of 18 plates were employed for 5 treatment concentrations and a control group, allowing for 3 replicate plates per treatment. Ten mL of exposure media was added to individual wells before the tests were started by randomly placing a larva from the common pool into each well. Larvae were transferred every 48 h to fresh exposure solutions in clean plates. After 6 d exposure, tests were terminated and individuals scored under a stereo microscope. Quality control criteria (> 70% survival in control group) for test acceptability were met for each test. Treatment effects were quantified by the percentage successful transition to megalopae in treatment groups relative to controls. Following prescribed statistical procedures (OECD, 2006), the R package DRC (R project., 2015, Ritz and Stribig., 2005) was used to model the test data and calculate toxicity estimates. Regression models evaluated included log-logistic and Weibull models of different levels of parametrisation. Model comparisons were conducted using the Akaike Information Criterion (AIC) and models that best described the data were applied to approximate pesticide concentrations eliciting 10 and 50% inhibition of successful transition relative to

	control animals (EC10 and EC50, respectively). The associated 95% confidence limits were estimated using the delta method. Format: The dataset is summarised in one file named ‘Coenobita variabilis pesticide toxicity data_eAtlas.xlsx’ Data Dictionary: The excel spreadsheet has one tab for each pesticide. The last tab of the dataset shows the measured (start and end of test) water quality (WQ) parameters (pH, salinity, dissolved oxygen (DO), and temperature) for each test. For the ‘Imidacloprid_Development tab: Nominal (µg/L) = nominal herbicide concentrations used in the bioassays Measured (µg/L) = measured concentrations analysed by The University of Queensland Rep = replicate notation is 1-3 No. of stage 1 zoea larvae at start = number of larvae per replicate at start of test No. of megalopae larvae day 6 = number of megalopae observed per replicate at end of test References: O’Brien, D. et al. Spatial and temporal variability in pesticide exposure downstream of a heavily irrigated cropping area: application of different monitoring techniques. J. Agric. Food Chem. 64, 3975-3989 (2016). van Dam, J. W. et al. Assessing chronic toxicity of aluminium, gallium and molybdenum in tropical marine waters using a novel bioassay for larvae of the hermit crab Coenobita variabilis. Ecotoxicol Environ Saf 165, 349-356, doi:https://doi.org/10.1016/j.ecoenv.2018.09.025 (2018). OECD. Current Approaches in the Statistical Analysis of Ecotoxicity Data., (OECD Publishing, 2006). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/. (2015). Ritz, C. & Streibig, J. C. Bioassay analysis using R. Journal of Statistical Software 12, 1-22 (2005). Data Location: This dataset is filed in the eAtlas enduring data repository at: data\nesp3\3.1.5_Pesticide-guidelines-GBR

Metadata language	eng
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Hierarchy level	Dataset

OnLine resource

Linkage	https://eatlas.org.au/data/uuid/769b9efa-9fb0-40c5-98e4-d3ac354371e0
Protocol	WWW:LINK-1.0-http--metadata-URL
Linkage	http://www.helenemarsh.com/publicationhttps://nesptropical.edu.au/index.php/round-3-projects/project-3-1-5/s/Unpublished/Grech_PhD.pdf
Protocol	WWW:LINK-1.0-http--related
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Protocol	WWW:LINK-1.0-http--related
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Protocol	WWW:LINK-1.0-http--related
Linkage	https://eatlas.org.au/pydio/public/au-nesp-twq-3-1-5-aims-pesticide-guidelines-gbr-coenobita-variabilis-2020-02-26
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Point of contact

Individual name	van Dam, Joost, Dr
Organisation name	Australian Institute of Marine Science (AIMS)
Role	Point of contact

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Metadata author

Individual name	eAtlas Data Manager
Organisation name	Australian Institute of Marine Science (AIMS)
Role	metadataContact

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