Minutes of the SETAC Global Soil Advisory Group (GSAG) meeting at the 26th SETAC Europe Meeting in Nantes

Date: 24th May 2016

Attendees: see attached list

1. Opening by Marlea Wagelmans (Bioclear)

2. Jörg Römke (ECT): Development of a test system for the identification of endocrine active substances in soil organisms (Invited lecture)

This study is sponsored by the Umweltbundesamt. The aim of the study is to make a compilation of the existing knowledge of EDC effects on soil organisms via a critical literature search, the identification of useful testspecies and recommendations for suitable new tests for EDC in soil. 23 papers were identified (1991-2015). In literature tests were found on Nematoda, Oligochaeta (Lumbricidae and Enchytraeidae), Arthropoda ( Isopodam Acari, Collembola (most studied species), Myriapoda, Insecta) and Mollusca (Gastropoda). Tested substances found were vertebrate-type steroids, xenobiotics acting as agonists / antagonists of vert.-type steroids, insect-growth-regulators and tri-butyl-tin. Several different end-points were reported: apical, specific (indicative) and anetocin expression. However, these endpoints may also be affected by general toxicity. Tests were mostly performed according to standard test methods. In total 66 suitable datasets but this set does not cover the range of soil organisms nor all chemicals. In general, available information on endocrinology and endocrine disruption is too sparse to identify critical developmental periods with sufficient certainty. Full life-cycle testing is required to identify critical developmental periods and to detect possible adverse effects of EDCs. Three useful life-cycle tests were already described in literature (Enchytraeus cryptuse and two with Folsomia candida).

3. Standardization issues Europe

Recently finished or almost finished Norms:
ISO 18311: Bait-Lamina test: Functional field test measuring invertebrate feeding rates
ISO 18187: Arthrobacter test: Short-term laboratory test, measuring dehydrogenase activity
ISO 19204: TRIAD approach: Site-specific, tiered approach for ecological risk assessment in soil
ISO 18400: Framework or soil sampling (SERIES): Covers all aspects of soil sampling (chemical, physical, pedological)

New Work Items, i.e. Norms under development:
ISO 20130: Measurement of enzyme activity patterns in soil samples using colorimetric substrates in micro-well plates.
ISO 20131: Easy laboratory assessments of soil denitrification, a process source of N2O emissions.
ISO 10872: Determination of the toxic effect of sediment and soil samples on growth, fertility and reproduction of Caenorhabditis elegans (Nematoda). (MODIFIED VERSION)
ISO/NWI 21285: Reproduction test for testing the quality of soils using the predatory mite Hypoaspis aculeifer (Gamasina, Acari)
ISO/NWI 21286: General guidance on the use of DNA barcoding in ecotoxicological testing.

Review of existing test guidelines with soil invertebrates:
- In 4 guidelines (OECD 220, enchytraeids; OECD 222, earthworms; OECD 226, predatory mites; OECD 232, springtails) the definition of vapour pressure had to be changed.
- Transfer of the existing ISO Norm 11268-3 (1999) "Earth-worm field test" into OECD format – and at the same time improving its technical performance, especially the test design:
  - Set-up of a project by the German UBA to support this work;
  - This process is supported by an OECD / SETAC / GSAG expert group, which started its activities May 23th

4. **Kees van Gestel (VU Amsterdam): BE-Basic and soil health (invited lecture)**

In this lecture, Kees van Gestel gave a nice overview of the Dutch research program BE-Basic and specifically soil health. BE-Basic (Biotechnology based Ecologically Balanced Sustainable Industrial Consortium) is a public-private partnership between universities, research institutes and industries of various scales in field of sustainable chemistry and ecology. This partnership promotes a shift from waste production to zero emission factories. In the biobased economy soil health is of concern for clean biomass production and recycling of (waste) materials \(\rightarrow\) sustainable soil use/circular economy. The program is divided into different flagships (types of research). One focuses on soil health in the biobased economy. Focus is on complex mixtures and biomass, from contaminated soils, or associated with accumulation of pollutants due to extensive concentration and recycling processes. Also attention is paid to potential toxic by-products generated within production chains. For soil health different new tools have been developed to assess the effects of mixtures of contaminants in soil but also the cause of the observed effects. Combinations of tools are needed for assessing steps in bio-based processes, to assess soil quality and to identify chemicals of concern; ecotoxicogenomics tools may provide useful info.

5. **News from regions and news on Standardization issues (North America)**

The following points were mentioned:

**Soil sessions Nantes, May 2016**
- Metals in the environment: Fate, speciation and bioavailability in soil, water and sediment
- Soil and water contaminants: evaluation, biomonitoring and bioidicators for effective management
- Prospective and retrospective soil risk assessment of chemical stressors

**Argentina, september 2016**
**Asia/Pacific, Singapore, 16-19 september 2016**
- Session: Terrestrial ecotoxicology (closed)
- Session: **Trophic transfer of nanomaterials in water and soil ecosystems (closed)**

**Latin America**
- Guideline of Ecological risk assessment contaminated sites ABNT
- Report of the Soil Governance event is available (April 2015)
- 5 different courses on soil ecotoxicology
- Establishment of the National Institute for Terrestrial Ecotoxicology TerrEcotox, has been approved in Brazil
North America (presented by Juliska Princz):

- SETAC NA 37th Annual Meeting, Orlando, Florida – World Congress (November 6-10, 2015)
  - Abstract submission deadline is June 8th, 2016
  - GSAG Sponsored Sessions (platform and poster)
    - Soil Contaminants: Fate, Bioavailability, Environmental Toxicology and Risk Assessment
    - Fate, Toxicology and Risk Assessment of Materials of Interest to the Military

Test Method Standardization

- Environment and Climate Change Canada
  - Development of new standardized soil test method using oribatid mites
    - Publication of test method for measuring effects on adult survival and juvenile production (28 days)
    - Performance data is being obtained in a variety of boreal and agricultural soils in order to establish test validity criteria
    - Test species has been used in the assessment of effects of mixed soil contamination from the field, and individual priority substances
    - Ring Test is underway with volunteers from Canadian and European laboratories (began January 2016)
      » Phase 1 – control performance in AS and field soils
      » Phase 2 – sensitivity to reference toxicant in field soil
      » Phase 3 – sensitivity of pest control product in field soil
  
Further inquiries can be addressed to either Rick Scroggins or Juliska Princz

Test Method Standardization

- Environment and Climate Change Canada
  - Refinement of earthworm test method (EPS 1/RM/45)
    - Refinement of Eisenia andrei reproduction test method to improve power of test in field soils
    - Addition of new boreal earthworm species: Dendrodrillus rubidus
      - Performance tests are underway in a variety of boreal soils to establish test validity criteria
      - Test species has been used in the assessment of effects of mixed soil contamination (petroleum hydrocarbons and brine spill), as well as rare earth elements (Ce, La, Pr, Sm, Tb and Er)
    - Approx. 2-year effort

Further inquiries can be addressed to either Rick Scroggins or Juliska Princz

6. Christian Schlechtriem (Fraunhofer IME): Bioaccumulation in earthworms (invited lecture)

- BAF values in oligochaetes will be determined in accordance to OECD 317 for representative substances, where BCF (BMF) values determined according to OECD 305 are available. Based on the experimental data obtained and data available in the literature, criteria for the assessment of the bioaccumulation potential in terrestrial organisms will be developed. In total, 95 publications were identified as relevant (85 on lumbricids, 9 on enchytraeids). 103 bioaccumulation factors (BAF) were published (92 on lumbricids, 11 on enchytraeids). In total, studies for 123 individual substances
representing 11 chemical groups, classes, or congeners were found. BAF values for Eisenia andrei/fetida in 21 studies for 19 substances was maximum around 3. Tests were performed with Metoxychlor, PCB 153 (Fh IME), Endosulfan and o-Terphenyl (ECT) in different artistic soil types. BSAF differs with different peat concentration. However, BAF in terrestrial organisms around 1, while in aquatic organisms are much higher.

7. **Call for partners EU initiatives**
If any of the participants of the meeting is preparing an EU proposal and is still looking for partners, please also think about the other participants. Contact them at the SETAC meeting, or afterwards.

8. **GSAG status and steering committee:**
Please register for GSAG on SETAC website, selecting GSAG from drop down menu at “Get Involved/Advisory Groups/Global AG/Global Soils. And update your info on SETAC Community Page.

Within SETAC, a discussion is going on about the continued use of name “Advisory Group”, primarily since Advisory Groups don’t really provide advice. No decision has been made yet about a new name descriptor.

The Soil Microbiology Advisory group has been dormant for a while. There was no objection at the meeting about incorporating this group into GSAG.

Next year, many steering group committee members need to step down. Need for new members. One volunteer from North America (Juliska Princz), two from Latin America (Vanessa B. de Menezes Oliveira and Julia Carina Niemeyer) and two from Europe (Patrick Kabouw and Chris Collins).

There was also a suggestion that we ask for students to join the GSAG and to be represented on the steering committee.

9. **A.O.B.**
- Björn Scholz-Starke: workshop on multi-species higher tiered test systems for soils with experts from Austria and Germany. Presentations about current practice, availability, fate, ecological relevant concentrations, lack of protection goals and other ongoing research. First draft of the report has been sent to participants. Final version will be sent to GSAG members. New workshop will be organised, perhaps funded by industry.
- Marlea Wagelmans: Joint symposium will be organised with members from Ecosystem Services AG and GSAG, probably also with Sustainability AG and sediments AG. About the links between these different groups. Across boundaries. Patrick Kabouw and Chris Collins volunteered to help. Organisation will start with email discussions.

10. **Closure of the meeting**
Appendix 1:
Report on GSAG-related activities in South America (May 2016)

by Cintia Carla Niva (Embrapa Cerrados, Brazil)

Guideline of Ecological risk assessment
Since 2014, the ABNT Special Committee on Solid Residues, has discussed methodologies for environmental risk assessment (ERA) for the implementation of a guideline to be applied on contaminated sites. Now, for the writing of the first draft, the committee has assigned a topic for each group of specialists. ABNT is the Brazilian partner of the International Organization for Standardization (ISO).

Report of the Soil Governance event is available
The Soil Governance event which happened in Brasília, 25-27 April, 2015, is available at:
http://portal3.tcu.gov.br/portal/page/portal/TCU/comunidades/biblioteca_tcu/biblioteca _digital/Governan%C3%A7a%20do%20Solo%20-%20Relat%C3%B3rio_web.pdf

Courses in 2015-2016:
1. "Terrestrial ecotoxicology and Ecological risk assessment", given by Maria Edna Tenório Nunes, Graduate School of Environmental Engineering Sciences (PPG-SEA), EESC/ USP, in São Carlos – SP, 2014 and 2015
2. “Toxicity of Mixtures”, 15-17 July, 2015, with Dr Antônio Nogueira (Aveiro University) and Dr Vanessa B.M. Oliveira (NEEA/EESC/USP), organized by Brazilian Society of Ecotoxicology
3. Course for Pharmaceutical Sciences students at UEL, supported by CNPq: "Alternative models for animal experimentation", Dr Julia Niemeyer, coordinated by Prof. Ricardo Almeida, August 2015
4. Short course "Setting up of ecotoxicological tests with soil invertebrates", Dr Vanessa B.M. Oliveira and Dr Miriam Bianchi, at Faculdade de Tecnologia, UNICAMP, February 2016, supported by Brazilian Society of Ecotoxicology
5. Short course “Soil Biology and Ecotoxicology” (8h), Dr Julia Niemeyer, at Integrated Academic Week of UFSC Centro de Curitibanos, Curitibanos, SC, April 2016

Talks in scientific events in 2015-2016:
3. Round table “Terrestrial toxicology”, with three talks, one on “Identification and Quanification of Soil Contaminants”, Dr. Mary Rosa Rodrigues de Marchi (UNESP – Araraquara), one on “Invertebrates as soil quality bioindicators”, Dr Cintia Carla Niva, and another on “Identification and quantification of soil contaminants”, Dr Jussara Borges Regitano, at III Symposium on Ecotoxicology, Rio Claro-SP, 18-20 April 2016 (http://ecotoxicologia.eco.br/en/scientific-programme/)
Coming this year:
1. Second edition of the Course for Pharmaceutical Sciences students at Londrina State University- UEL, supported by CNPq: “Alternative models for animal experimentation”, Dr Julia Niemeyer, coordinated by Prof. Ricardo Almeida, August 2016
2. ECOTOX2016 – XIV Brazilian Congress of Ecotoxicology, Curitiba – PR, 7-10 September, 2016 (http://www.ecotox2016.com.br/)
4. Special Session “From individual to ecosystem – terrestrial ecotoxicology as a tool to understand the effects caused by different soil contaminants”, coordinated by Dr Vanessa B. de Menezes Oliveira (EESC - USP), Dr Miriam de Oliveira Bianchi (EESC - USP) and Dr. Paulo Roger Lopes Alves (UFFS – Chapecó), with 7 talks.
5. Short course "Ecotoxicology – Effects of chemical pollution in aquatic and terrestrial ecosystems and in human health", Dr Rhaul Oliveira and Dr Vanessa B.M. Oliveira, at Brasilia University- UnB, Brasilia, DF, October 2016

GSAG Latin America
Cintia Carla Niva thanks the opportunity of interacting with GSAG members during the last years, although a presential interaction has not been possible. Two new names are suggested for replacement, both very much engaged in soil ecotoxicology:
- Dr Vanessa B. de Menezes Oliveira, currently she is a postdoctoral fellow at EESC – USP (vanessa.ambiente@gmail.com, C.V. at http://lattes.cnpq.br/6669878362148727)
- And, alternatively, Dr Julia Carina Niemeyer, currently she is a professor at UFSC (juliacarina@gmail.com, C.V. at http://lattes.cnpq.br/8185023532378108), but she said it will be difficult for her to go to SETAC meetings outside Brazil in the next years.

Breaking News:
An interactive national project for the establishment of the National Institute for Terrestrial Ecotoxicology, called TerrEcotox, has been approved by INCT, a program which promotes the creation of National Institutes of Science and Technology as strategic componentes of Brazilian system of Science Technology and Innovation. The TerrEcotox is coordinated by Dr Evaldo Gaeta Espindola, EESC/USP, who is originally from aquatic ecotox and currently the president of the Brazilian Society of Ecotoxicology. The institute will be established and supported mainly by the Ministry of Science and Technology, CNPq and CAPES. TerrEcotox will integrate scientists of all over Brazil and some from Europe to promote advances in terrestrial ecotoxicology for six years. This is a big step for soil ecotox in Brazil and means this science branch and importance has been officially recognized in the country. Dr Evaldo counts today with 3 postdocs and several students in soil ecotox including Dr Vanessa B.M. Oliveira, Dr Miriam Bianchi and Dr Maria Edna T. Nunes, the latter three contributed and will contribute significantly for TerrEcotox.
Appendix 2 Africa
# Appendix 3:

## Attendance of the GSAG meeting held at the 26th SETAC Europe Annual Meeting in nantes, on 24th May 2016

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