

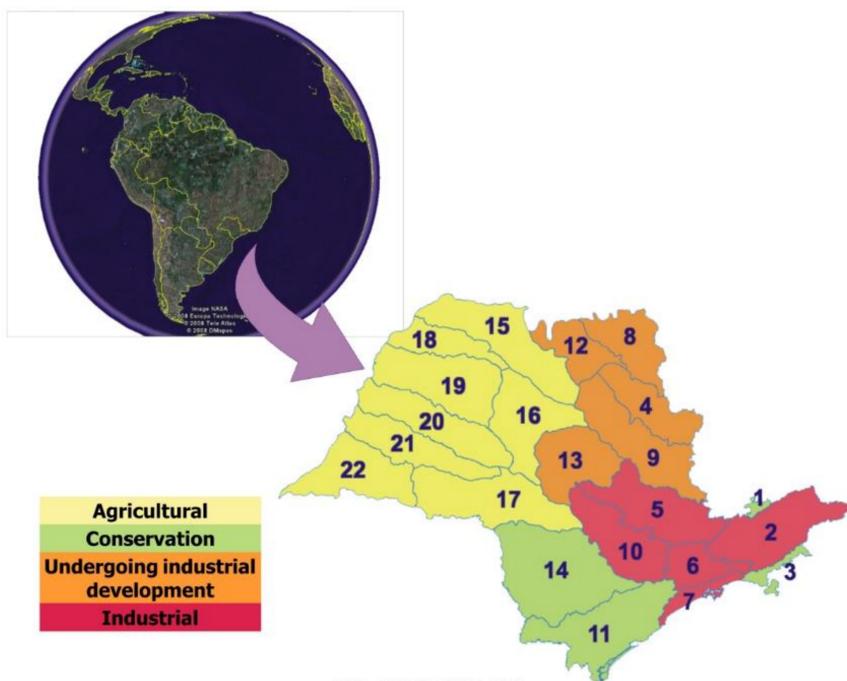
ESTROGENIC ACTIVITY OF GROUNDWATER SAMPLES IN SÃO PAULO STATE, BRAZIL

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Introduction

Some environmental contaminants and many other are known as Endocrine Disrupting Chemicals (EDC). They may interfere with the body's endocrine system and produce adverse effects in humans, aquatic life and wildlife. Some compounds such as dioxin and dioxin-like, PCB, pesticides, some plasticizers as bisphenol A (BPA) and phthalates, polybrominated biphenyls (PBB) and some substances found in personal care products are spread in the environment and may be labeled as EDC. The goal of this study was to evaluate the potential for endocrine disruption of water samples of 31 groundwater sites used as a source of drinking water in São Paulo State, Brazil, using a new bioluminescent yeast assay (BLYES).



Materials and Methods

Groundwater samples were collected twice a year (during its highest and lowest levels). Samples were solid-phase extracted using HLB cartridges eluted with methanol.

Estrogenic activity was assessed using the BLYES (Bioluminescent Yeast Estrogen Screen) assay, performed according to Sanseverino et al., 2005. Briefly the assay is based in the exposure of yeast (*Saccharomyces cerevisiae*) that harbor the human estrogen receptor along with bacterial bioluminescence genes.

Positive and negative controls were included for quality assurance.

Results

- 1) The results show no presence of Estrogenic Activity in 29 sites using BLYES test (< 0.1 ng E2-eq/L).
- 2) Results of Estrogenic Activity can be expressed as a BQ value (Benchmark Quotient). For this work, we adopted trigger values of 3.8 ng E2-eq/L suggested by Brand W. et al., 2013. Values of $BQ \leq 1$ mean there is no potential human health concern if the water was to be consumed over a lifetime period.
- 3) Three sites presented positive values. Analandia: 0.11 and 3.8 ng E2-eq/L, Barretos: 0.19 and < 0.1 ng E2-eq/L and Muritinga do Sul: 0.16 to < 0.1 ng E2-eq/L. Applying trigger values we found $BQ < 1$ and therefore there is no human health risks for consumers.

Conclusions

These results (2011-2012) indicate that under BLYES assay conditions the assessed sites show no presence of EDC capable of activating the human estrogen receptor.

For the first time in Brazil BLYES strains were used in a monitoring program. Assessment of the sites will proceed up to 2015. At the end of 2015, more than 120 sampling sites will be covered in our groundwater monitoring program.

References

1. Brand W. et al, 2013. Trigger values for investigation of hormonal activity in drinking water and its sources using CALUX bioassays. *Environment International* 55 (2013) 109–118.
2. Sanseverino et. al. Use of *Saccharomyces cerevisiae* BLYES expressing bacterial bioluminescence for rapid, sensitive detection of estrogenic compounds. *Appl. Environ. Microbiol.*, 71, 4455-4460, 2005.