bic microbial metabolism as well as growth of aquatic plants, which favors the assimilation of nutrients and, consequently, improves the quality of the treated effluent.

Conclusions: Therefore, bioremediation with water hyacinth used in sugarcane vinasse showed to be effective in reducing the BOD and is an alternative for the treatment of this waste.

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PP5.6
Evaluation of the toxicity and genotoxicity of percolated from sugarcane vinasse in *Oreochromis niloticus* (PISCES) by micronucleus test

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Introduction: Brazil is a leading producer of alcohol and consequently, the largest producer of vinasse, residue derived from the distillation of ethanol. The use of this waste as fertilizer is an alternative to the reuse of the same, as well as being rich in organic matter, is an important source of replacement water and minerals to the soil. However, the substances present in this residue can undergo leaching and/or percolation and reach ground and/or surface water.

In this context, before use of large-scale vinasse in the sugarcane crops, it is necessary to evaluate the effects of percolated vinasse on aquatic organisms. Therefore, the micronucleus test is an effective tool in pollution monitoring of aquatic environments; when applied on fish, for example, demonstrates the ability of pollutants cause damage to genetic material. *Oreochromis niloticus* was chosen because it is one of the species most commonly used to evaluate the environmental contamination.

Objective: In the present work, micronucleus and nuclear abnormalities tests in erythrocytes of *Oreochromis niloticus* (Perciformes, Cichlidae) were performed to diagnose the toxicity and genotoxicity of percolated from sugarcane vinasse.

Materials and methods: A total of 40 specimens of *Oreochromis niloticus* (Perciformes, Cichlidae) were used. The bioassay was performed in replica, with exposure of the specimens to a pure groundwater (NC), crude vinasse (CV) and percolated vinasse (PV). The blood collected by cardiac puncture with heparinized syringes was subjected to the standard procedure for micronucleus test. Statistical analysis was performed by Kruskal–Wallis and Anova tests ($p < 0.05$).

Results: The main changes were micronucleated erythrocytes (MN), binucleated cells and in cell death. Among the nuclear abnormalities, the most noted were the nuclei type: "notched", "blebbed" and "lobed". The sample PV, although shown micronucleated erythrocytes, statistical values demonstrated a significant reduction in this endpoint when compared to CV; however, such values were also statistically significant compared to the NC. Samples of CV showed statistically significant values in relation NC for nuclear abnormalities and PV samples also showed significant values only in relation to CV.

Conclusions: It can be concluded that the soil can minimize the genotoxic effects of crude vinasse, acting as a filter, due to the significant differences between the erythrocytes of fish exposed to samples of VB and VP.

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PP5.7
Integrated biomarker response: An approach to assess antioxidant response in nesting green turtles

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Introduction: Several defense mechanisms against oxidative stress and damage have been used as biomarkers. Single biomarker response is often difficult to interpret; therefore the use of integrated biomarker data into indexes for the evaluation of contaminant-induced stress has increased.

Objective: The aim of this study was to apply the integrated biomarker response (IBR) to a set of antioxidant biomarkers in order to assess their response in female green turtles, *Chelonia mydas*, nesting in the southern coast of Campeche, Mexico.

Materials and methods: From July to September 2014, blood samples (6–10 mL) were collected from 29 female *C. mydas* nesting in three sites along southern coast of Campeche: Isla Aguada (18°47′ N, 91°29′ W), Isla de Carmen (18°41′ N, 91°42′ W) and Sabancuy (18°59′ N, 91°11′ W). The antioxidant parameters measured included SOD, GPx, GST, GSH, lipid peroxidation and cholinesterase activity. Total variation of the biomarkers was calculated applying the IBR.

Results: Only GPx and SOD activity varied significantly among nesting sites. Nor did biomarker activity of the turtles correlate significantly with their length or curved carapace width. The IBR values and the star plots indicated significant differences in antioxidant biomarkers responses among nesting sites. The IBR values showed the arrangement of the nesting sites: Isla de Carmen (13.39) > Sabancuy (2.121) > Isla Aguada (1.278). The largest star plot area was obtained for Isla de Carmen as well as the highest scores by biomarkers (GPx, GST, SOD and lipid peroxidation).

Conclusions: The IBR allowed visual comparison of nesting sites indicating spatial variability of the biomarkers response. The IBR values and the star plots areas suggest that some factors triggered a higher oxidative stress and damage in the nesting *C. mydas* from Isla de Carmen.

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