REPRODUCTIVE IMPACT ASSESSMENT OF ENDOCRINE-DISRUPTING CHEMICAL MIXTURES: A COMPARATIVE APPROACH USING DAPHNIA MAGNA AS AN IN VITRO MODEL

[1,3]Apú, N., [3]Ruiz-Michelsen, J., [2]Rommes, F., [3]Alvarado-Arias, M., [3]Méndez-Rivera, M., [3]Lizano-Fallas, V.

[1]Instituto de Investigaciones Farmacéuticas (INIFAR), Facultad de Farmacia, Universidad de Costa Rica, 2060 San José, Costa Rica.

[2]Département Agronomique, Haute Ėcole Charlemagne Huy, 4500 Huy, Belgium.

[3]Centro de Investigación en Contaminación Ambiental (CICA), Universidad de Costa Rica, 2060 San José, Costa Rica.

INTRODUCTION: Global pesticide use has increased significantly in recent decades, raising concerns about human exposure to environmental contaminants and associated health risks. Among these, endocrine-disrupting chemicals (EDCs) have been linked to reproductive impairments and rising infertility rates. In Costa Rica, regions with intensive pesticide use report reduced fertility among agricultural workers and a higher prevalence of male infertility. These findings underscore the need to assess the effects of chemical mixtures rather than individual compounds. OBJECTIVE: To evaluate the reproductive effects of prioritized pesticide mixtures with endocrine-disrupting potential, using Daphnia magna as an in vitro aquatic model organism, within a comparative approach that integrates both European and local exposure scenarios. MATERIALS AND METHODS: A review of human biomonitoring studies conducted in Costa Rica over the past 25 years was used to prioritize pesticides detected in human fluids with potential reproductive toxicity. Based on this, two local mixtures were identified. Additionally, sub-mixtures from the European RiskMix project were included to assess the effects of combined exposures. All mixtures were tested using Daphnia magna to evaluate reproductive outcomes. RESULTS AND CONCLUSION: Exposure to both local and European EDC mixtures resulted in reduced reproductive capacity in Daphnia magna. These findings emphasize the relevance of evaluating mixture effects in toxicological studies and support the integration of real-life exposure scenarios into risk assessment frameworks.