

# Report on the outcomes of a Short-Term Scientific Mission<sup>1</sup>

Action number: CA18221

Grantee name: Samuel González López

## **Details of the STSM**

Title: Evaluating the Risk of Pesticide Exposure for Amphibians Using Residue Data from Water Sources in an Extensive Agrarian Region

Start and end date: 30/07/2023 to 30/10/2023.

## **Description of the work carried out during the STSM**

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

During my STSM, I was part of the ecotoxicology research group at the Instituto Nacional de Tecnología Agropecuaria (INTA, Argentina), which carries out field and laboratory research on the impact of agrochemicals on amphibians and other wildlife. The main STSM objective was to evaluate the environmental risk of pesticides for amphibians in an Argentinean stream, which aimed to serve as a proof-of-concept risk assessment for amphibians inhabiting waters affected by agricultural activities. To do so, I was provided with comprehensive pesticide residue data of monitoring studies conducted in four sites of a medium-sized stream (Arroyo Pergamino). My first task was to conduct a literature review of toxicity data of the substances detected in the stream, both for native and non-native amphibian species. When sufficient toxicity data was available, amphibian-specific acute and chronic predicted no effect concentrations (PNEC) were calculated by dividing the Lethal Concentration 50 (LC50 within 96 hours) and No Observed Effect Concentration (NOEC within 21 days) of the most sensitive amphibian species by an assessment factor (AF) of 10. Then, we calculated Risk Quotients (RQ) by dividing measured environmental concentrations of each single substance by their respective PNEC. We used RQ to rank pesticides based on single substance risk and their contribution to mixture risk. Besides, we aimed to identify native amphibian species potentially vulnerable to pesticides detected in the stream.

Throughout my STSM at INTA, I also had the opportunity to assist in the collection of amphibian egg clutches and early-stage tadpoles of the indigenous species *Rhinella arenarum* and *Hypsiboas pulchellus*. Larvae were reared in the laboratory until they reached Gosner stage 27. Then, we initiated an assay to evaluate the effect of the insecticide Thiametoxam at realistic concentrations on the metamorphosis of anurans. Treatments with Thiametoxam were combined with treatments with levothyroxine to stimulate metamorphic events. Each replicate consisted of 12 individuals housed in a Petri dish with 200 mL of the experimental solution, that was renewed every 48 h. Animals were fed with boiled vegetables ad libitum. Before each solution renewal, survival and stage of development were

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<sup>1</sup> This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

recorded. This assay is currently in-progress and expected to be completed when animals reach Gosner stage 42 (metamorphic climax).

### **Description of the STSM main achievements and planned follow-up activities**

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

This STSM fulfilled the main achievement of providing an in-depth assessment of risk for amphibians inhabiting waters affected by pesticide use, by evaluating data from water sources where agriculture is of great importance, such as Argentina. Pesticides detected in the site of study were ranked based on the risk that measured environmental concentrations pose to local anurans and other amphibians. Given the differences in the risk assessment process when commercializing phytosanitary products, it is important to understand how products approved in both markets (European and Argentine) can affect amphibians, to identify possible weaknesses in the pesticide registration process on both sides of the Atlantic. Besides, another relevant achievement is the successful initiation of the experiments to study effects of neonicotinoid insecticides on anuran metamorphosis. The completion of this work is expected to provide useful data to fill gaps relative to the characterisation of pesticide exposure and effects on amphibians. Depending on the results, this study will likely produce a publication in high-impact factor journals.

Thanks to this STSM, I acquired valuable training in risk assessment and aquatic toxicity testing. Besides, I complemented my knowledge on amphibian husbandry by learning new techniques and working with diverse species. Furthermore, my participation in scientific seminars and activities at INTA's facility, along with my involvement in an international toxicology congress co-organized by my host, allowed me to establish numerous meaningful connections. I am optimistic that these newfound relationships will endure due to our shared scientific interests, and I eagerly anticipate future collaborative opportunities with both my hosts and the individuals I had the pleasure of meeting during my stay.