# DPR Environmental Monitoring Branch
# Surface Water Protection Program
# Contract Outline

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| **TITLE** | Phyto-mitigation to remove neonicotinoids in surface water runoff |
| **CONTRACT NUMBER** | 21-C0035 |
| **PRINCIPLE INVESTIGATOR** | Professor J. Gan |
| **INSTITUTION** | The Regents University of California Riverside |
| **CONTRACT TERM** | October 2021- June 2023 |
| **FUNDING** | $179,734 |

**PROBLEM STATEMENT**

The transport of insecticides especially neonicotinoids from agricultural/urban settings to surface water represents a potential risk to aquatic ecosystems owing to their strong hydrophilicity, moderate to long persistence, and known non-target toxicity to aquatic invertebrates. Practical and implementable practices are urgently needed to mitigate offsite movement of neonicotinoid insecticides to surface waters. Given the strong systemic properties of neonicotinoids, assessing the neonicotinoid removal abilities of native vegetation will provide useful insights to develop natural and relatively inexpensive phyto-mitigation strategies to minimize the transport of neonicotinoids into surface water.

**OBJECTIVES**

The primary objective of this project is to evaluate the potential of common wetland plant bulrush and common grass tall fescue for absorbing and attenuating neonicotinoids from runoff water. The obtained knowledge may be used for developing plants-based mitigation practices for removing neonicotinoid residues in runoff water and protecting water quality.

**TASKS**

Task 1. Carry out hydroponic experiments to evaluate the capacity for hardstem bulrush and tall fescue to absorb and remove neonicotinoids from water, and understand the influence of plant density/biomass and contact time on the removal rate.

Task 2. Construct field plots mimicking wetland cells and vegetated buffers at the Agricultural Operations at UC Riverside.

Task 3. Using 4-6 neonicotinoid insecticides, carry out multiple experiments simulating runoff episodes and treatment events and monitor changes in pesticide concentrations before and after passing through the wetland cells and vegetated buffer strips.

Task 4. Analyze variables influencing neonicotinoid removal, such as vegetation density, growth stages, soil properties, slope, and hydraulic residence time, and use models to consider different configurations and to optimize the mitigation efficacy of neonicotinoids using vegetated wetlands, vegetative filters, grassed waterways, and bio-swales.