Faculty Member Contact Information

Name	Kyong-Sup Yoon
Contact Info	
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Department	Environmental Sciences

1 Funded, 1-2 Unfunded URCA Assistant

	This position is **ONLY** open to students who have declared a major in this discipline.	M
	This project deals with social justice issues.	
	This project deals with sustainability (green) issues.	
	This project deals with human health and wellness issues.	
	This project deals with community outreach.	
	This mentor's project is interdisciplinary in nature.	

Are you willing to work with students from outside of your discipline? If yes, which other disciplines?

Yes

How many hours per week will your student(s) be required to work in this position?
(Minimum is 6 hours per week; typical is 9)

3-9

Will it be possible for your student(s) to earn course credit?

ENSC 499, BIOL 493 1-3

Location of research/creative activities:

SW 2120

Brief description of the nature of the research/creative activity?

Determination of cross-resistance in DDT-resistant fruit flies

Resistance to chemical insecticides has become a significant challenge in pest management due to prolonged and widespread exposure that reduces the effectiveness of control strategies. Insecticide resistance develops through various mechanisms, including target-site insensitivity, metabolic detoxification, reduced penetration, and behavioral avoidance. Resistance to DDT in Drosophila melanogaster has been extensively studied. Specifically, the 91-R strain of D. melanogaster is a well-established DDT-resistant strain, used in conjunction with susceptible control strains (91-C and CS) to study insecticide resistance mechanisms. There is a growing recognition that resistance mechanisms are not always specific to a single insecticide. Cross-resistance, where resistance to one insecticide confers resistance to others, is a critical concern as it reduces the effectiveness of multiple insecticides and complicates pest management. In previous studies on 91-R flies, it has been observed that overexpression of Cyp6g1, confers resistance to DDT and extends cross-resistance to neonicotinoids (imidacloprid) and insect growth regulators (lufenuron). Additionally, research has shown that ABC transporters contribute to cross-resistance between ivermectin and pyrethroids by facilitating the efflux of these compounds from cells. To better understand cross-resistance patterns, it is essential to examine multiple insecticide classes with different modes of action. This study aims to assess cross-resistance in the 91-R strain of D. melanogaster to four different classes of insecticides (pyrethroids, organophosphates, neonicotinoids, and avermectins). The study is expected to contribute to the understanding of insecticide cross-resistance, identify shared resistance mechanisms across insecticide classes, and offer guidance for improving pest management strategies.

Brief description of student responsibilities?

Students will be responsible for participating various research activities including fruit fly laboratory maintenance, perform fruit fly mortality bioassays, and data analysis using PoloPlus and Sigma Plot software.

URCA Assistant positions are designed to provide students with *research or creative activities* experience. As such, there should be measurable, appropriate outcome goals. What exactly should your student(s) have learned by the end of this experience?

Students will learn fruit fly development and basic insect biology through participation of fruit fly laboratory maintenance, dose-response relationship and synergism.

<u>Requirements of Students</u>

If the position(s) require students to be available at certain times each week (as opposed to them being able to set their own hours) please indicate all required days and times:

Students can have flexible schedule.

If the location of the research/creative activities involves off campus work, must students provide their own transportation?

NA.

Must students have taken any prerequisite classes? Please list classes and preferred grades:

BIOL 150

Other requirements or notes to applicants: