UC RIVERSIDE

BCH 252 Seminar Series

Rachael Hamby, Biochemistry & Microbiology Graduate Student, UC Riverside

Seminar Title: "Harnessing nanoparticles for dsRNA Delivery to plant pathogens in Spray-Induced Gene Silencing techniques"

Abstract: Rachael Hamby, Lulu Qiao, Jonatan Niño Sánchez, Angela Chen, Luca Capriotti, Hailing Jin

Fungi comprise one of the most devastating groups of plant pathogens and are a major threat to global food security. Alarmingly, resistant strains of fungi have developed against every major class of antifungal used in both agriculture. In order to safeguard food security, innovative strategies for combating fungal pathogens must be developed. Recent discoveries have found that many species of fungi are able to internalize RNAs from the environment, where they can then target and silence complementary genes through environmental RNAi. This prompted the development of a new plant protection strategy, Spray-Induced Gene Silencing (SIGS), where fungal-gene targeting RNAs are topically applied to plant material to inhibit fungal disease development. Though promising, a major drawback to SIGS approaches is the instability of RNA in the environment. Docking the RNAs to nanoparticles can stabilize the RNA and prolong its activity against fungal pathogens. Here, we show two classes of nanoparticles which can stabilize the RNA and prolong its activity against the fungal pathogen, *Botrytis cinerea*. Firstly, layered double hydroxide, a formulation termed BioClay™, which can extend the RNAi effect of SIGS RNAs from 1 to 3 weeks on tomato leaves, and from 3 to 10 days on tomato fruits. Next, we found that Artificial Nanovesicles composed of cationic lipids can also extend the RNAi effect of SIGS RNAs from 3 to 10 days on tomato fruits and grape fruits, and from 1 to 3 weeks on grape leaves. This research shows that nanoparticles can serve as a powerful tool in developing long-lasting practical SIGS applications, and is a step towards using RNA-based antifungals as an alternative to traditional fungicides.

ZOOM Link: https://ucr.zoom.us/j/96184326158?pwd=VVFEVVFuMVNUdnhjOHo3Y2lpWEhWZz09

Meeting ID: 961 8432 6158

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Tuesday, October 25th, 2022

12:00 p.m. - 12:50 p.m.

Host: Dr. Xuan Liu