Project Title: Hispanic Medicinal Plants for Managing Chronic and
Infectious Diseases
Investigator: Vattem, Dhiraj
Department: Family Consumer Science

Project summary:
Pseudomonas aeruginosa (PAO1), an opportunistic pathogen in immune
compromised patients is under the regulation of the LasR-RhlR system for its
QS mediated development of virulence. Medicinal plants used Hispanic
medicine used for several centuries to treat common ailments, are well known
for their antimicrobial effects on a variety of human pathogens. However, few
studies have investigated its QS related antivirulent activities. Our objective
was to screen for the QS inhibitory properties of 20 high quality
Hispanic/South American medicinal plants, understand their mechanism of
action and investigate their effect on the expression of QS regulated virulence
factors in PAO1. Methods**:** QS inhibition (QSI) of sub-lethal concentrations
(SLC) of plant extracts was measured in violacein producing
Chromobacterium violaceum (O26, 31532) bioassay model. Effect of these
extracts on PAO1 virulent factors pyocyanin, elastase, and total protease were
quantified by standard protocols. Results indicated that all GT extracts
reduced violacein production by 56 75%. The results suggested the primary
mechanism of QSI was a combination of (1) reduction in AI formation and (2)
inhibition of AI activity. The extracts reduced pyocyanin synthesis, with 7
extracts completely inhibiting its formation and secretion. The 7 extracts also
completely inhibited the expression of elastase. The specific activity of total
proteases secreted by PA-O1 was lower than the control for all the extracts
that had quorum sensing inhibition activity. We observed that the extracts
from these plants inhibit QS related virulent processes in PA-O1 primarily by
inhibiting synthesis of AI and by interfering with their activity.