Clemson University

Clemson University Fruit Tree Translational Genomics

Requested Action

Clemson is requesting $1 million in funding to support the continued development of fruit tree genomics that currently underpins the future of competitive specialty crop agriculture in South Carolina and the U.S.

Identified Need

This work identifies, characterizes and manipulates the genes and gene actions that control: the normal growth and development of fruiting trees, natural resistance genes to both abiotic and biotic stresses, genes that influence the progression of disease in the trees (e.g. peach tree short life), and genes controlling quality and yield of fruits. This work provides the pipeline for future fruit tree improvement and sustainability.

Clemson is at the heart of fruit tree genomics research in the U.S. targeted at addressing the key issues for the U.S. Rosaceae Industry. Through previous support from USDA competitive grants, NSF, BARD and the South Carolina Peach Council, Clemson has made significant progress in identification and characterization of many important fruit tree genes that control many of the traits that are important to sustaining fruit tree agriculture in the state and nation. These include disease resistance genes, genes controlling tree development and growth, fruit quality, and quantity. Researchers expect to sequence in entirety the peach genome in the very near future and this genomics resource will revolutionize the way fruit tree genetics are approached and will provide the means to breed higher quality, more disease resistant trees in the future.

Currently, work is focused on identifying genes that control resistance to diseases such as, Peach Tree Short Life, *Armillaria* root rot, Plum Pox Virus, and others. However, Clemson is also studying genes that control chilling requirements in trees and their winter dormancy, as well as studying a series of genes important to fruit quality and human health. All projects are intimately dependent on advances in understanding of the fruit tree genome.

Expected Outcome

It is anticipated that this research will deliver genes that control many of the agronomical important traits in these trees. Manipulation of these genes as targets in fruit tree breeding programs using modern translational breeding strategies (which we are developing as part of a proposed nationwide CAP type project) will ensure that the next generation of high quality, disease resistant specialty crops in South Carolina and the nation. This will ensure that the U.S. fruit industry will have a competitive position in an increasingly complex global economy.