in 2019. The QTLs and SNP markers will provide breeders with robust tools to improve selection for resistance to these three economically important diseases of spinach through marker-assisted selection (MAS) and GS.

Specified Source(s) of Funding: USDA NIFA SCRI

10:30 AM – 10:45 AM

Development of Molecular and Phenotyping Selection Tools for Spinach Breeding

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Spinach (*Spinacia oleracea*) production in the US has grown steadily during the past years, however production must thrive in a dynamic environment constantly challenged by abiotic and biotic stresses. Such stresses have a profound effect on quality and yield. Therefore, the current challenge in spinach production is to increase productivity by improving resistance and tolerance to diseases and environmental stresses. Due to the dioecious nature of spinach, breeding efficiency is very low using conventional methods. One of the major constraints to implement modern molecular breeding approaches used to be the lack of a good linkage maps and the lack of high-density molecular markers. But, with the advancements in next-generation sequencing for genotyping and the availability of a reference genome, it is now possible to identify markers associated to traits of interest. However, in order to precisely link these markers to traits of interest, it is required to phenotype large and diverse populations. Traditionally, phenotyping has been performed by manual measurements at single time points. The task is very time consuming and results in high variability due to human error. This report describes Texas A&M AgriLife Spinach breeding program efforts to develop molecular and phenotyping tools to improve breeding selection efficiency for cultivar development. Tools include development of high throughput phenotyping methodology using unmanned aircraft vehicles to monitor crop growth throughout the season and the development of molecular markers associated with plant growth, disease resistance, and abiotic stress.

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Weed Control & Pest Management 3

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9:45 AM – 10:00 AM

Comparison of Alternative Germplasm and Commercial Cover Crops for Improved Traits and Utility in Florida

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Cover crops can contribute an array of agroecosystem services to cropping systems, including improving soil health and suppressing weeds and plant-pathogenic nematodes. Inconsistent seed availability or an undesirable trait may limit cover crop adoption. The commercially available sunn hemp (*Crotalaria juncea*) cultivars, Tropic Sun and AU Golden, have the perceived respective constraints of variable seed set within the continental US and low biomass production. 'Iron Clay' cowpea (*Vigna unguiculata*) produces hard seed that can result in volunteer plants emerging in subsequent cash crops. Therefore, alternative germplasm lines of sunn hemp (Sanni) and cowpea (US 1136, US 1137 and US 1138) were compared with corresponding commercially available cultivars to determine their suitability for Florida cropping systems. Additionally, an unnamed commercially available slenderleaf rattlebox (*C. ochroleuca*) variety and a slenderleaf rattlebox accession (PI274767) were compared. Field trials were conducted in summer 2018 on-station and at three organic farms in north-central Florida using a randomized complete block with four replications. Data were collected on cover crop biomass, weed biomass, weed density, and photosynthetically active radiation (PAR) penetrating the cover crop canopy. Total shoot biomass produced by Sanni, 'Tropic Sun' and 'AU Golden' did not differ significantly at any of the four locations. A significant difference in total weed biomass was observed at only one farm where Sanni resulted in less grass biomass production than the commercial cultivars. This contributed to lower total weed biomass production in Sanni than the commercial sunn hemp cultivars. The three cowpea germplasm lines produced similar or greater shoot biomass than 'Iron Clay' and suppressed total weed biomass as effectively as or better than 'Iron Clay'. The PAR results indicated increased canopy closure over time that may partially explain the lower total weed biomass and densities with the cover crop treatments compared to the weedy control at eight weeks after planting. No significant difference in shoot biomass accumulation and weed suppression was observed with the slenderleaf rattlebox germplasm types. Shoot biomass production with slenderleaf rattlebox was comparable to cowpea and lower than sunn hemp; and may be an alternative to sunn hemp where lower biomass and less fibrous residue is preferred. However, additional work to optimize slenderleaf rattlebox seeding rates will be needed. The equivalent or better performance of the alternative germplasm lines of sunn hemp and cowpea indicate that Sanni, US 1136, US 1137 and US 1138 are suitable replacements for the commercial cultivars in Florida.

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10:00 AM – 10:15 AM