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2021 ASHS Annual Conference

Register Tell a Friend

ASHS 2021 Denver, Colorado

When: 8/5/2021 to 8/9/2021
Thursday, August 5, 2021

Where: Hyatt Regency Denver Convention Center, Denver, Colorado
United States

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Register

Online registration is available until: 7/31/2022

Automated Phenotyping Provides Insights into Leaf Angle Changes in Chile Pepper Response to Stress

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parents and progeny to discover single nucleotide polymorphisms (SNPs). A total of 1078 SNP markers were identified, and 597 markers were selected and used for genetic map construction and QTL analysis. The genetic map covered 1517.4 cM in total length with an average space of 2.6 cM between markers. A total of 37 highly and 67 moderately resistant individuals to powdery mildew were identified; likewise, PepMoV

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Abstract: Elevated levels of atmospheric CO_2, as a substrate of photosynthesis, has the potential to increase crop yields; however, the increase in temperatures and other environmental factors associated with climate change can negate the positive effects of increased CO_2. In response to high temperature, chile pepper (*Capsicum annuum*) tends to abort reproductive organs, which is associated with capacity to uptake assimilates. The effect of leaf angle on light interception efficiency, photosynthetic rate, and yield has been investigated in other crops. To understand the role leaf angle plays in heat tolerance, we evaluated 300 *C. annuum* members of the G2PSol *Capsicum* core collection using an automated plant phenotyping platform as well as manually measuring yield and pollen concentration and activity using impedance flow cytometry. The experiment was conducted during the hotter summer (April to July, 2020), and the cooler winter (October 2020 to January 2021) seasons in Shanhua, Taiwan. We used a randomized complete block design with three replications each consisting of four plants. The leaf angle and Normalized difference vegetation index (NDVI) data were log transformed and all data were analyzed using ANOVA, and correlations were determined using Pearson's correlation coefficient in R. While the interaction of season by accession was significant for all traits evaluated, the main effect of season was the greatest contributor to variability observed. Leaf angle, yield, pollen concentration and activity, and NDVI were all greater during the winter season than in the summer season, as expected. While daily differences in leaf angle were observed, the differences between stress and non-stress conditions were greater than the measured circadian leaf movement. Positive correlations were found between yield and greater average leaf angle throughout the growing season ($r = 0.59$) as well as leaf angle during the stress conditions of high temperature ($r = 0.61$) and high solar radiation ($r = 0.62$), in addition to NDVI ($r = 0.75$) and daily growth rate ($r = 0.74$). Significant negative correlations were found between yield and leaf angle during low light conditions ($r = -0.68$) and the difference between leaf angle on high and low solar radiation days ($r = -0.75$). Selection for greater leaf angle under stress conditions could be a means to improve heat tolerance and yield in chile pepper. This study provides a basis for further research in this area and highlights the need to explore the various components of heat stress response in breeding for tolerant cultivars.

Specified Source(s) of Funding: Funding for this research was provided by the long-term strategic donors to the World Vegetable Center

10:30 AM Cultural Methods Affect Mechanical Harvest

chile in NM. We identified promising harvesters for NM green chile comprising of inclined counter-rotating double helix mechanisms that lift the fruit off the plants. Ongoing breeding efforts are developing lines with plant and fruit characteristics amenable to this mechanism. Phenotypic characteristics such as increased height to first primary branch (bifurcation) and a lack of lower basal branches have been a focus for breeding. Along with these traits, fruits with easily removed pedicels (destemming) is critical for mechanically harvested green chile that is destined for commercial processing. While breeding advancements have been accomplished, cultural farming methods also influence these traits. We have observed that a direct sown chile crop is more amenable to mechanical harvest due to less uprooting of plants during mechanical harvest compared to transplanted chile. We found bifurcation height was significantly taller (about 20%) in direct sown plots compared to transplanted plots for two commercial NM pod-type cultivars, "Sandia" and "NuMex Joe E. Parker," as well as jalapeño breeding lines (LS means, $P<0.05$). Plants that were direct sown had few to no basal branches, significantly lower than transplanted chile for every observed cultivar/line (LS means, $P<0.05$). Interestingly, a previous study we performed in direct sown chile showed that early season drought stress results in higher average bifurcation height (20.7 cm) than compared to normally irrigated direct sown plants (15.9 cm, LS means, $P<0.05$). Destemming force was measured on harvested fruit from three "easy-destemming" jalapeño lines. There was a significant increase in force required (about 10 – 25%) for destemming on fruit from plants grown in direct sown plots relative to transplanted plots (LS means, $P<0.05$). The cause for this unexpected result is still unknown. These collective findings illustrate the importance of considering both genetic and environmental variables. As harvest mechanization of green chile comes to fruition in New Mexico, this information will be vital for its success.

Specified Source(s) of Funding: National Institute of Food and Agriculture, NM Chile Association, NM Chile Commission, and the NMSU Agriculture Experiment Station

10:30 AM – 11:30 AM *Mineral Hall F*

LIVE Q&A - "Fruit Breeding" - Poster Session

Moderator: Seonghee Lee,

Genetic Control of Sweetness and Acidity in Blackberry

Carly Godwin*, *University of Arkansas*; Margaret Worthington, ; Rishi Aryal, *North Carolina State University*; Hamid Ashrafi, ; Renee Threlfall, and John Clark,

Abstract: The global blackberry industry has experienced rapid growth during the past 15 years (*Rubus* subgenus *Rubus* Watson). Even so, many industry stakeholders report complaints from consumers and grocers stating blackberries are often too tart or not sweet enough for their liking. Studies have shown most consumers prefer sweet blackberries with relatively low