

Evolution of native blueberry *Vaccinium* species and ploidy levels in North America

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Abstract:

Blueberries are an important fruit crop in North America and North Carolina with several breeding programs which strive to improve blueberries for production in North America. Some major difficulties include the slow breeding process of blueberries and other woody crops, the multiple species that make up blueberries, and varying ploidy levels within blueberry species. Differing ploidy levels and species can specifically limit crossing ability and create a high level of heterozygosity in crosses. As trends in plant breeding shift due to climate change and a higher demand for genetic diversity, there is an ever-increasing need to incorporate both elite and native traits in cultivated varieties, as well as high demand for faster molecular breeding methods for slower plants, such as blueberries. Fortunately, blueberry species in the genus *Vaccinium* exist natively in North America, however, not a lot is known about the relationship between many of these species, the evolution of blueberry species, and how these native species contribute to cultivated species grown today. The addition of different ploidy levels within *Vaccinium* and blueberry species adds another level of complexity in understanding blueberry evolution. Without this background knowledge of blueberry evolution, it can make it difficult to identify the best sources of improvement traits that have the easiest and fastest ability to be incorporated. This project focuses on identifying native *Vaccinium* species and their relation to each other through phylogenetic and sequence analysis as well as ploidy analysis. Native species can be compared both within the different ploidy levels as well as a whole set to better understand how these species relate to each other and how these varying ploidy levels developed within blueberry species. Wild species can also be compared via sequences to cultivars and breeding lines to identify the best source of native traits for incorporation into blueberry breeding programs both here at N.C. State and across North America.