

(P03)

Application of Non-targeted Metabolomics to Cooked and Raw Potato Tuber: Implications to Breeding for Health Traits

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Cooked potato contains a diverse set of small molecules with demonstrated effects on human health, including micronutrients and other bioactive compounds. Characterizing the variation of small molecules (metabolites) in cooked potato can inform on the potential to breed for a healthier tuber. To characterize the type and quantity of health-related compounds in potato, raw and cooked tubers from 60 cultivars were evaluated for biochemical diversity using a non-targeted, mass spectrometry (MS) based metabolomics workflow. The 60 cultivars spanned 4 market classes (Russet, Red, Yellow, and Specialty) and the data was interrogated to quantify variation in select nutrients and bioactive compounds within and among market class. Cooked and raw potatoes were lyophilized and metabolites were extracted using an aqueous methanol mixture. Liquid and gas chromatography-MS workflows were applied to conduct non-targeted metabolomics on the metabolite extracts. The analysis revealed that potato biochemical diversity was influenced by cultivar, market class, and cooking. In all, the analysis supports several potato tuber bioactive compounds as candidates for future breeding efforts. Current efforts include determining whether nutrients and health-related compounds in raw tuber correlates with cooked tuber, negating the step to cook potatoes for future experiments.

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Characterization of Potato Genotypes in Response to Drought

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Potato is one of the most sensitive species to water deficit. Given the climate change scenario it is urgent the need to develop drought tolerant varieties. Thus, the objective of this study was to characterize a set of tetraploid potato clones in relation to water stress conditions. The work was carried out at Embrapa Temperate Agriculture, Pelotas-RS, Brazil (32°45'S, 52°30'W) in spring season of 2012 and 2013. Eighty four clones representing germplasm of the Brazilian breeding program and modern varieties from several countries were evaluated. A RCBD with four replications was used. Two water availability regimes were applied control, and water deficit stress. For the water deficit regime, polyethylene glycol 6000 was added to the nutrient solution simulating a stress of -0.129 MPa. The stress was applied during 14 days, starting 50 days after planting. The clones were characterized through the following variables: number of days to start tuberization (DST); total tuber number (TTN); shoot dry weight (SDW); root dry weight (RDW); tuber dry weight (TDW), and osmotic potential. A principal component analysis was applied. The first two components explained 71.9 % and 69.03 % of the total variation, respectively, for 2012 and 2013 trial. In both trials, DST was negatively correlated to TTN. For TDW, clones that showed better yields in the control condition were the same ones that showed better results under water deficit. For the set of clones evaluated, it seems to have an escape mechanism of drought tolerance, that is, the early tuberization clones are less affected by water deficit stress.