

analysis and two multivariate methods to determine the GEI. For this, eight advanced potato genotypes (*Solanum tuberosum* Group Phureja) and two commercial controls were used in 11 locations during two consecutive semesters. The variables measured were total yield and specific gravity. A combined analysis of variance across the environments was performed. Parametric stability statistics were estimated and after the correlation coefficients measured between them. Significant differences were found between the genotypes and their GEI. The level of association among the statistic values obtained was measured using the Spearman correlation coefficient. The genotypic mean for tuber yield and specific gravity was significantly correlated to parametric stability statistics P_i ($r = 0.98$), AMMI1 ($r = 0.63$), and SREG1 ($r = 0.92$). Due to the high correlation with the mean, the amount of information they provide and the fact that they are easily interpreted, multivariate AMMI and SREG analyses are preferred over univariate methods. The average and stability parameters of the trait, allow us to determine that the genotypes UN-59, UN-50, UN-52 and UN-4 are superior for yield and UN-64 is superior for specific gravity.

29. Gene expression biomarkers for prediction of nitrogen-related yield and specific gravity in potato

Mia Parenteau¹, Bernie Zebarth², Athyna Cambouris², Alison Nelson², Judith Nyiraneza², Jose Hector Galvez³, Martina Stromvik³, Martin Lague², Hong Gu¹ and Helen Tai²

1 *Dalhousie University, Canada*

2 *Agriculture and Agri-Food Canada, Canada*

3 *Mc Gill University, Canada*

Corresponding author: Helen Tai, helen.tai@agr.gc.ca

Gene expression in potato foliage associated with crop response to fertilizer nitrogen (N) treatments was examined for application as a sufficiency predictor of N. Genome-wide transcriptome sequencing identified genes responsive to potato N sufficiency. Sampling of leaf tissue was performed at four time points during the day (0800, 1100, 1400 and 1600 h) on two sampling dates (48 and 63 days after planting) for three potato cultivars (Atlantic, Shepody, Russet Burbank). There were four replicate plots. The terminal leaflet of the last fully expanded leaf was sampled for 20 plants per plot and pooled for each replicate. RNA was extracted and genome-wide gene expression was quantified using transcriptome sequencing. A total of 63 genes were identified which were responsive to N fertilization across cultivars and sampling dates, but were not affected by time of day of sampling. The expression of these genes was evaluated in potato plants grown in seven field trials at four sites in two different years with different cultivars and N treatment rates and sources. A total of 439 samples of 20 leaf disk pools were collected. RNA was extracted and quantified using Nanostring nCounter. Gene expression predictive of relative yield (yield per plot/ maximal yield for trial), specific gravity and total N uptake was analyzed using regression analysis and supervised machine learning algorithms. The result of the field experience indicated that tuber yield and N uptake responded to applied N rate.

30. Frying quality of elite potato clones in the south of Brazil

Fernanda Quintanilha Azevedo¹, Francieli Cima², Tuane Araldi², Raquel Kneib², Daiana Wolter² and Arione Pereira³

1 *Embrapa Clima Temperado, Brasil*

2 *Universidade Federal de Pelotas, Brasil*

3 *Embrapa, Brasil*

Corresponding author: Fernanda Quintanilha Azevedo, fernanda.azevedo@embrapa.br

Potato production in the southern part of Brazil occurs in two main annual crops, autumn and spring. The objective of this work was to study the frying quality of two elite clones in the Rio Grande do Sul state. Field trials were conducted during autumn and spring in 2017 at Embrapa Clima Temperado, Pelotas-RS, Brazil. Two elite clones (F50-08-01 and F183-08-01) from the Embrapa potato breeding program, were compared to two commercial cultivars (Asterix, a French-fry variety, and BRSIPR Bel, a chipping variety) in relation to specific gravity, glucose content, and chip color. ANOVA revealed significant differences among genotypes for the three characteristics, and significant GxE interaction for specific gravity and glucose content. Regarding the frying color, the two elite clones had lower scores (darker color) than 'BRSIPR Bel', but they did not differ from 'Asterix'. In relation to specific gravity, in autumn, the clone F183-08-01 was outstanding, whereas in the spring, the two elite clones were statistically superior to both commercial varieties. Regarding glucose, in the autumn, the contents were higher than in the autumn than in the spring. In autumn, both elite clones had lower glucose content than 'Asterix', but higher than 'BRSIPR Bel'.

31. Local breeding to develop potato varieties with increased resistance against limiting production factors in Costa Rica

Arturo Brenes¹ and Luis Gómez¹

1 Universidad de Costa Rica, Costa Rica

Corresponding author: Arturo Brenes, arturo.brenes@ucr.ac.cr

Costa Rica produces more than 3000 ha of potatoes annually. Up to 45% of production costs correspond to pest and disease control. Late blight and leafminer are the most constraining biotic factors in potato production in Costa Rica. Indiscriminate use of chemicals has led to selection of resistant populations and potential negative environmental impact. Genetic resistance is the best option for pest and disease control, and might reduce the costs of applying pesticides and their environmental impact. Potato breeding allows the development of varieties with high resistance or tolerance to many pests and diseases. However, in tropical countries like Costa Rica, growing conditions are more favorable to biotic and abiotic stressors than those in countries where potato varieties are traditionally bred and selected: Therefore the importation and evaluation of materials from other countries has been ineffective. A local potato breeding program was initiated more than a decade ago at the University of Costa Rica, which has been focused on the generation, through sexual crossing, of hybrids with combined resistance to late blight (horizontal resistance) and leaf miner as well as other important agronomic traits such as high yield and tuber quality. Through years of field evaluation in different potato growing regions of Costa Rica, new genotypes have been selected. One of them, named Elbe-UCR, was released for commercial production at the end of 2015. Elbe-UCR shows a very high resistance to late blight and leaf miner, as well as, high yield, high dry matter content and good processing quality.

32. Enhancing capabilities for potato and sweetpotato research in China and Asia-Pacific: the case of CCCAP

Alberto Maurer¹, Xiaoping Lu¹ and Li Min¹

1 International Potato Center (CIP), China Center for Asia-Pacific (CCCAP), China