

Exploiting Genetic Variation for Elevated Mineral Concentrations in Potatoes

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Why potatoes?

Potato is the 4th world crop in production terms.

Most important non-grain food crop.

Important role in the delivery of dietary micronutrients including Fe, Ca, Zn and Mg.

Now promoted as a better staple food for the world's poor.

Bioavailability of minerals is high in potatoes

- high concs of ascorbate.
- low concs of phytate & oxalate.



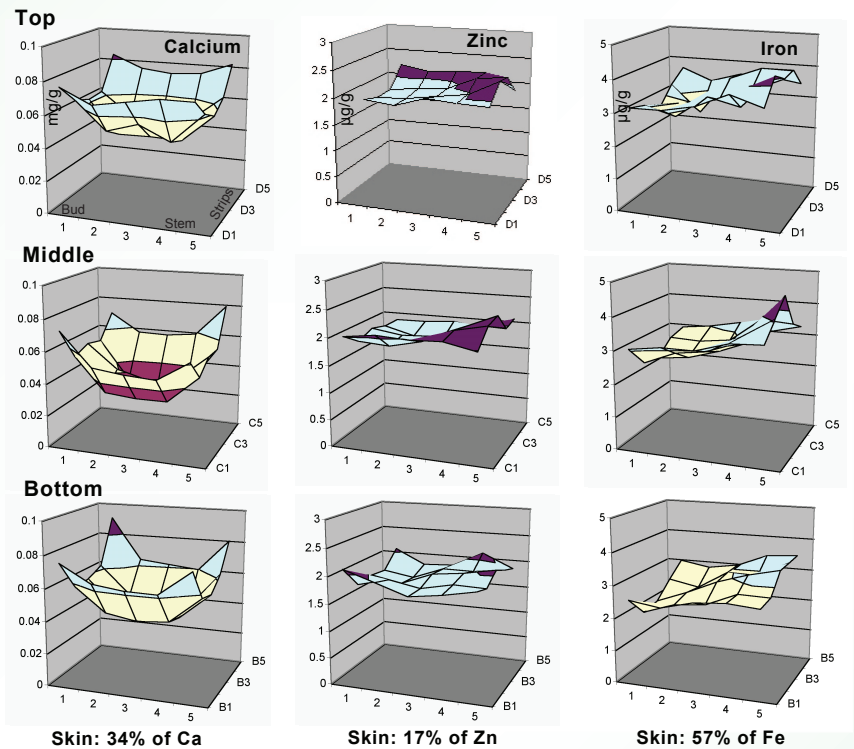
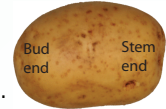
Within tuber mineral variation

Central portion of the tuber is low in dry matter (10% cf 24% DM).

Potato skin contains most iron.

In tuber flesh, calcium is mostly peripheral.

Zinc and iron are higher near the stolon attachment point.



Materials and methods

Within tuber mineral variation:

- Five tubers of *Solanum tuberosum* cv. Stirling.
- Five concentric skin samples.
- Peeled tubers were cut into three slices.
- Each slice diced into five strips.
- Each strip cut into 5 pieces (1-5).

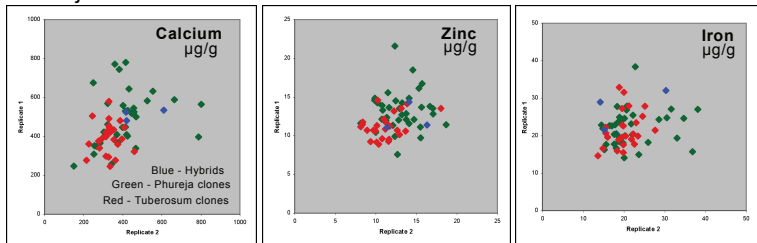
Field replicate and genotype variation:

- Phureja-Tuberosum Core Collection, 64 clones, 2 replicates.
- Neotuberosum population, 450 clones, 2 replicates.
- Sampled two pairs of opposite eighths.
- Freeze-dried powder, acid digested and submitted to ICP-MS.

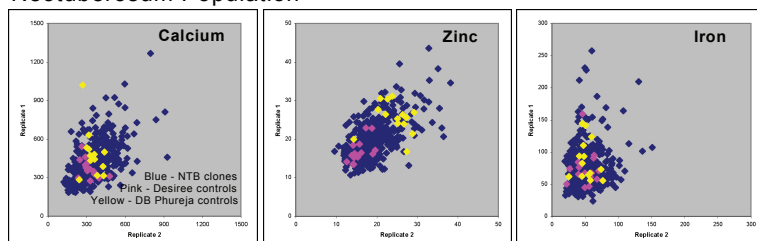


Field replicate and genotype variation

Phureja-Tuberosum Core Collection



Neotuberosum Population



Significant mineral variation exists between diploid Phureja and tetraploid Tuberosum clones.

Phureja tends to have higher mineral concs and lower yield.

Neotuberosum (NTB) clones show a greater variation in most minerals and have a broader genetic background.

Weaker correlation between reps for iron, suggesting more environmental influence.

Control lines Desiree and DB337/37 (Phureja) differ for calcium and markedly for zinc.

Correlations among minerals at high levels of significance indicates areas for future study.



Work in Progress

QTL analysis using a tetraploid mapping population Stirling x 12601ab1 underway.



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