



Critical Evaluation of the Aqueel[®] to Reduce the Irrigation Requirements and Erosion of Potato Farming

Background

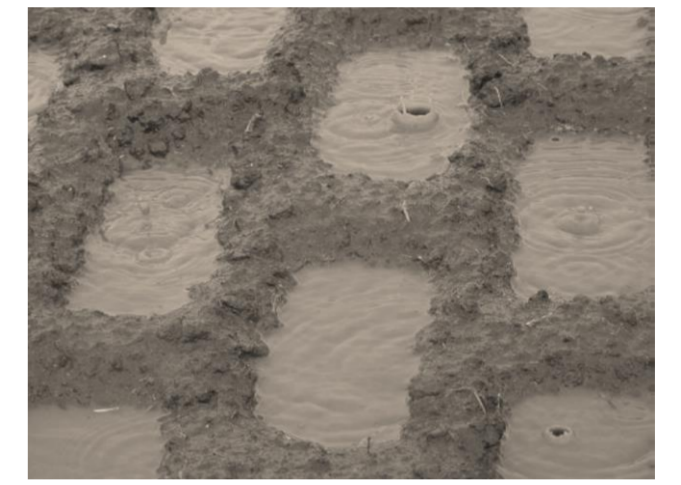
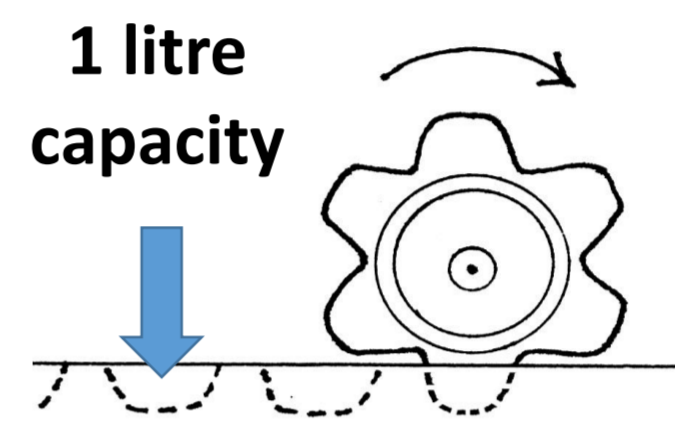
Potato farming is an irrigation intensive activity. Knox (2011) highlighted that irrigation costs have been doubling every 5 years and now account for approximately 13% of the total costs per hectare of potato farming.

In collaboration with Sainsbury's, Greenvale AP and Andrew Williams at Home Farm, Nacton, Cranfield University has been tasked with investigating strategies for improving the irrigation efficiency of potato farming without adversely affecting yield or quality whilst minimising runoff and erosion.

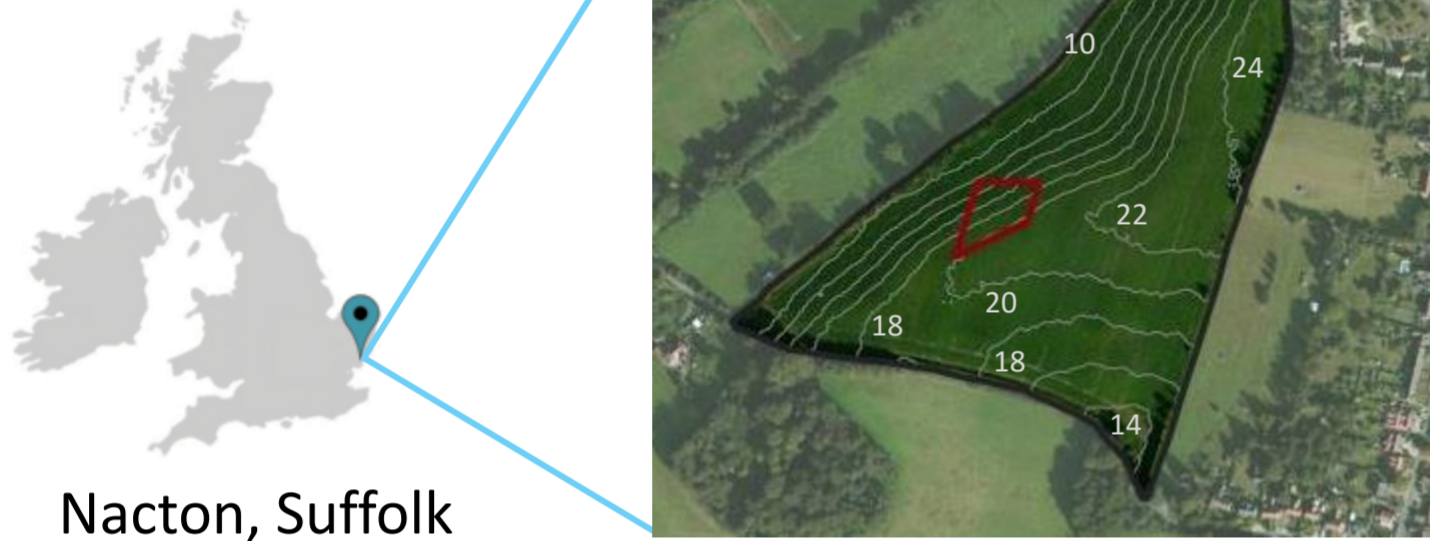


Reservoir Tillage Technology: The Aqueel[®]

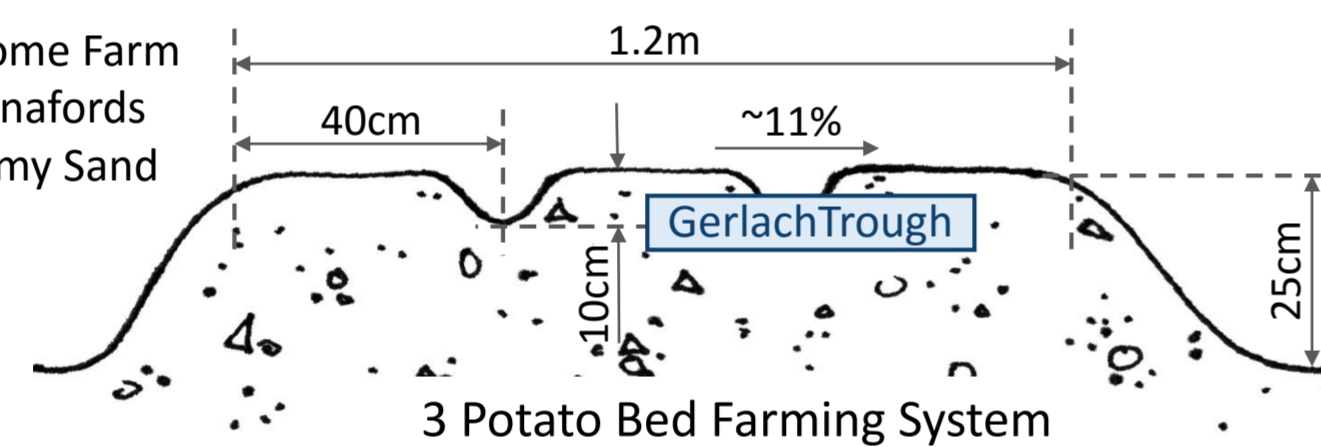
The Aqueel[®] (Simba International Ltd.), a reservoir tillage implement, has been identified by the Potato Council as an effective farming technology for irrigation usage. Polymer wheels with an undulating radial design create depressions on the soil surface that act as mini-reservoirs. Trials by Ventura et al. (2003) and Patrick et al. (2007) have demonstrated the Aqueel's efficacy in reducing runoff and erosion while improving infiltration. A field trial was setup to test the Aqueel's effectiveness at reducing the irrigation requirements and erosion associated with potato farming.



The Field Trial



Farm: Home Farm
Field: Bunafords
Soil: Loamy Sand



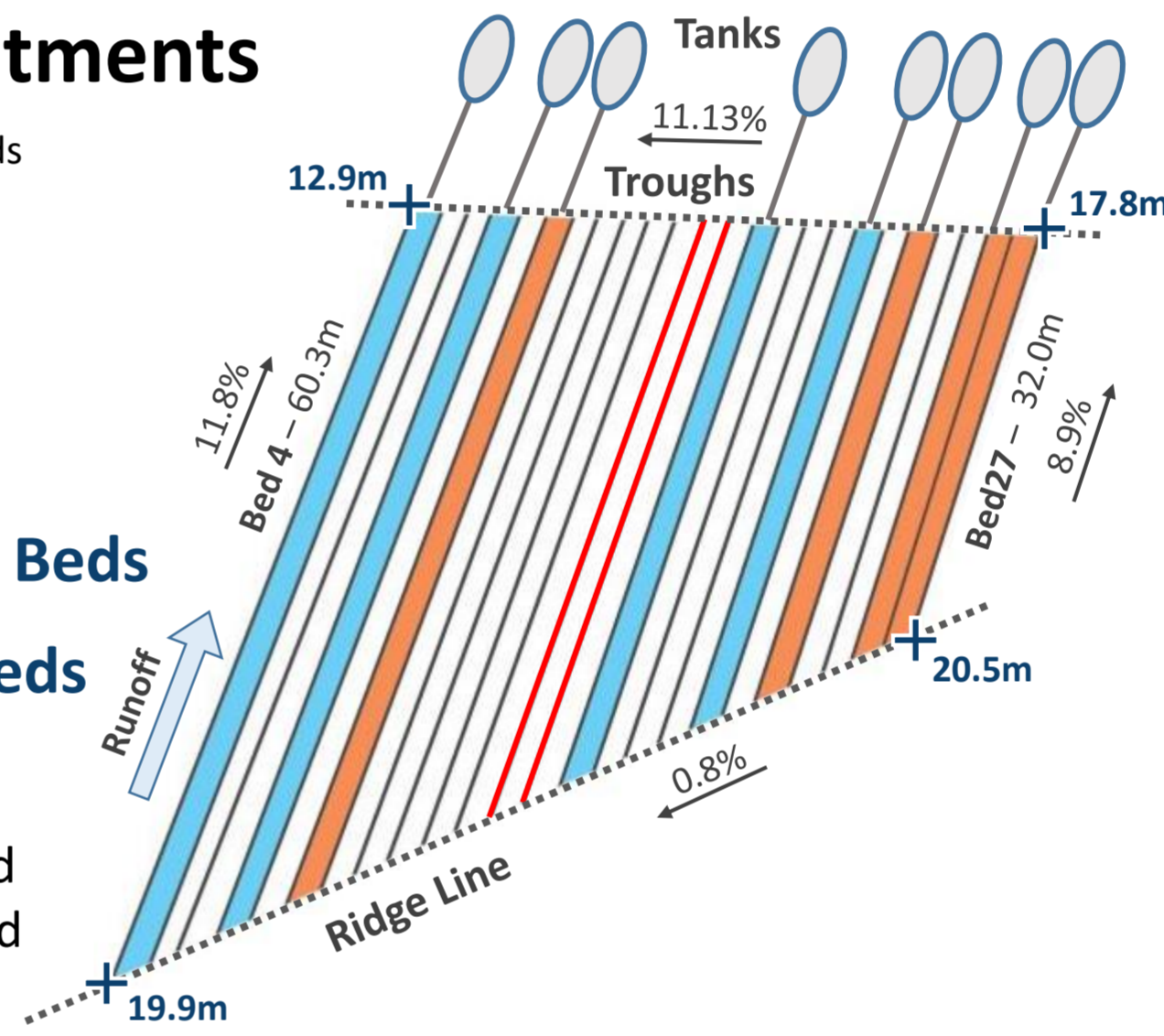
Row Treatments

- Aqueeled Beds
- Control Beds
- Wheelings
- Irrigation Tramlines

4 Aqueeled Beds

4 Control Beds

Sediment and runoff captured with trough and tank setup



Collection Tank with linear level sensors



Stainless steel Gerlach Troughs

Results - 5 Sampling Events

Figure 1: Field Trial Schedule of Irrigation, Fertiliser, Rainfall and Sampling Events

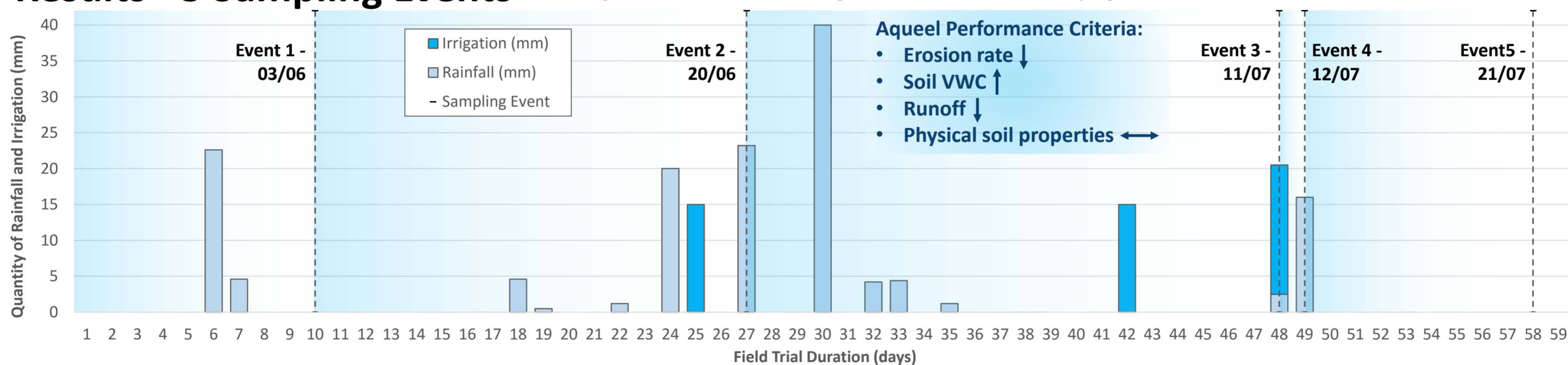


Figure 2: mean soil volumetric water content (VWC%) at 5cm depth

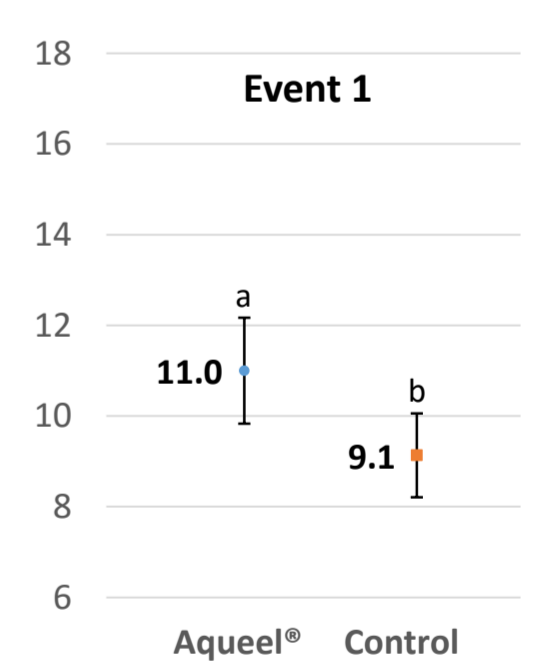


Figure 3: Comparison of Erosion Rates (kg ha⁻¹) Over 5 Sampling Events

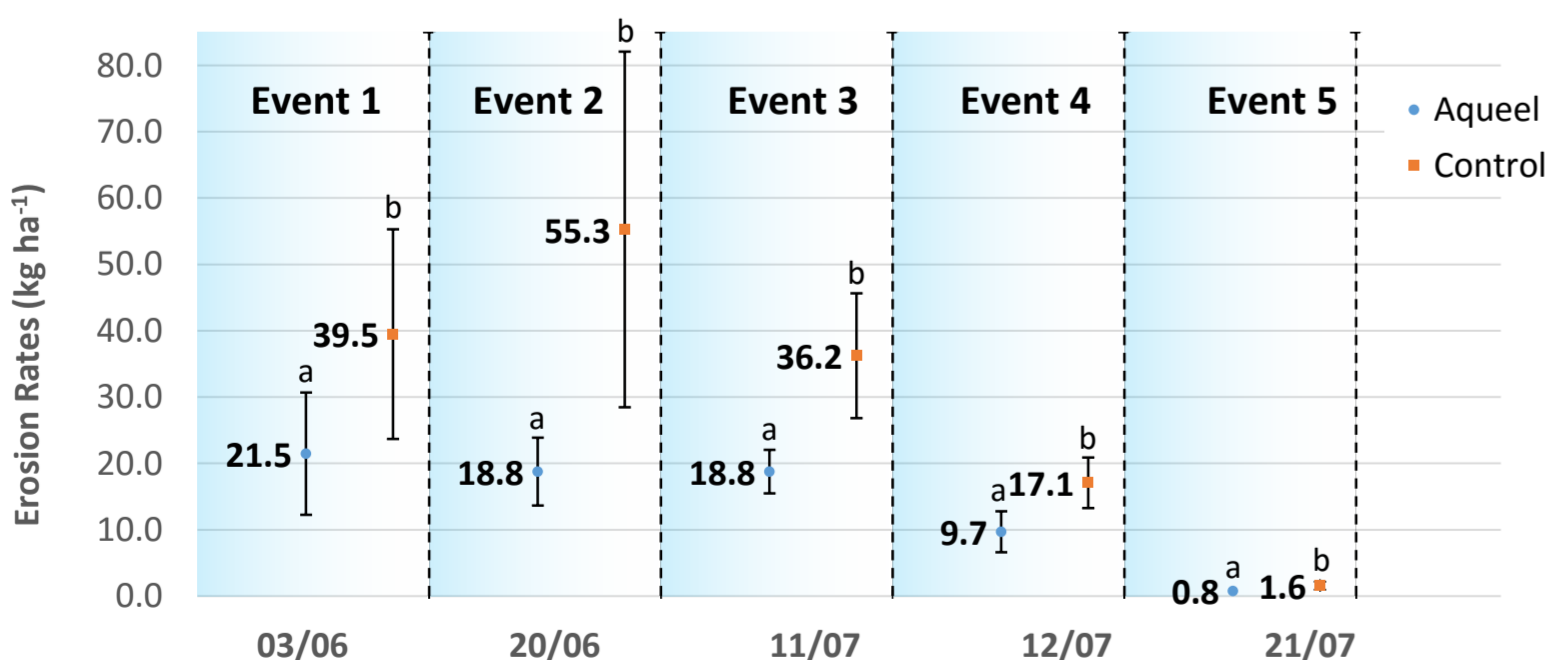
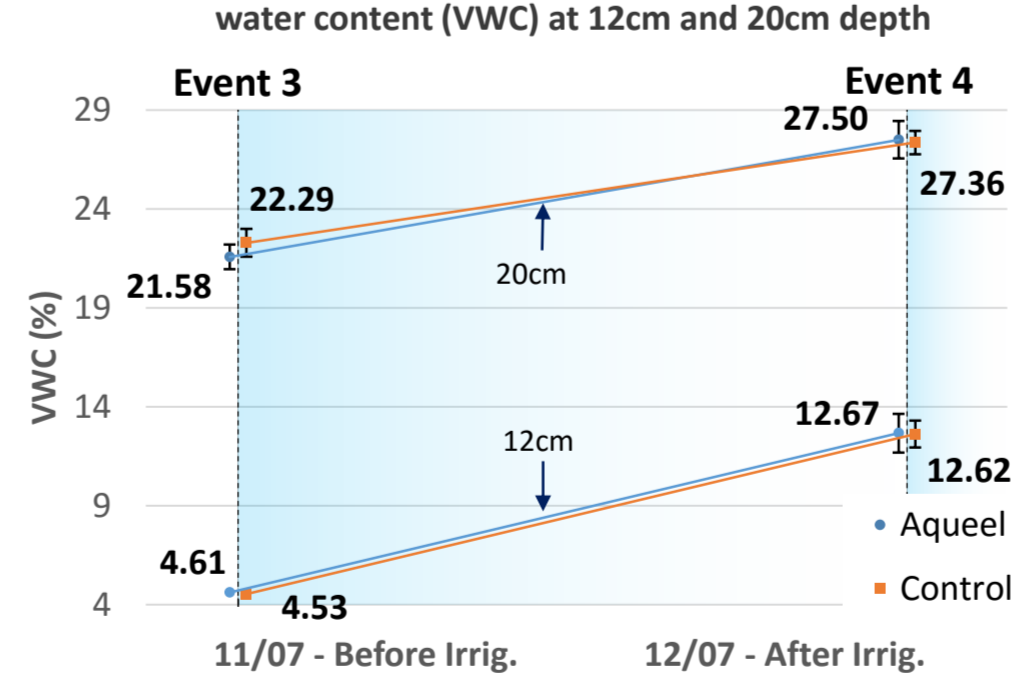


Figure 4: Effect of Irrigation on mean soil volumetric water content (VWC) at 12cm and 20cm depth



Conclusions

- Erosion rate significantly reduced ($p < 0.05$) by ~50% for all sampling events
- 20% increase in VWC% in top 5cm of Soil
- No change in VWC% at 12cm or 20cm
- No significant effect on runoff
- No effect on physical soil properties

Error bars display 95% confidence interval. Significant difference based on post-hoc Fisher LSD analysis denoted by a, b.

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Greenvale AP
Natural choice for fresh potatoes

