**Quantifying critical N dilution curves across G** × **E** × **M effects for potato using a partially-pooled Bayesian hierarchical method**

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# Supplemental Materials

Figure S. Fitted hierarchical Bayesian model shown for each level of variety within location: (a) Argentina × Bannock Russet, (b) Argentina × Gem Russet, (c) Argentina × Innovator, (d) Argentina × Markies Russet, (e) Argentina × Umatilla Russet, (f) Belgium × Bintje, (g) Belgium × Charlotte, (h) Canada × Russet Burbank, (i) Canada × Shepody, (j) Minnesota × Clearwater, (k) Minnesota × Dakota Russet, (l) Minnesota × Easton, (m) Minnesota × Russet Burbank, and (n) Minnesota × Russet Burbank. For each level of variety within location, the median fitted critical N concentration [%Nc] is shown as the solid black line. Each level of index (i.e., experimental observation date, see Table S1) nested within variety within location is shown as an individual panel, with the experimental data shown as either blue or red points and with the median fitted linear-plateau curve as a grey line. Experimental data were classified depending on whether the N concentration [%N] for that given level of biomass is less than the %Nc (i.e., Deficit) or is greater than %Nc (i.e., Surplus). The total number of experimental observations classified as Deficit (i.e., red points) or Surplus (i.e., blue points) is summarized for each level of index nested within variety within location and is also summarized for each level of variety within location.

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| **(j)** | Graphical user interface, diagram  Description automatically generated |
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Figure S. Pairwise comparison of the difference in critical N concentration values [∆%Nc] between the critical N concentration [%Nc] for a given reference curve and %Nc for all other levels of variety within location: (a) Argentina × Bannock Russet, (b) Argentina × Gem Russet, (c) Argentina × Innovator, (d) Argentina × Markies Russet, (e) Argentina × Umatilla Russet, (f) Belgium × Bintje, (g) Belgium × Charlotte, (h) Canada × Russet Burbank, (i) Canada × Shepody, (j) Minnesota × Clearwater, (k) Minnesota × Dakota Russet, (l) Minnesota × Easton, (m) Minnesota × Russet Burbank, and (n) Minnesota × Russet Burbank. The grey shaded region represents the 90% credible region (lower bound, 0.05 quantile; upper bound, 0.95 quantile) for ∆%Nc. The colored points represent the median value for ∆%Nc at a given Biomass level where blue or red color respectively indicate that credible region for ∆%Nc does or does not contain zero. The solid black line at constant value of zero represents %Nc for reference curve. The range of biomass values for which ∆%Nc is not significantly different (i.e., credible region contains zero) is given in brackets.

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