Hi Gina,

Some comments about our conversation today. Mainly, I wanted to explain you NLME a bit and I was less concerned about this particular analysis. I did ramble a bit about things which are not terribly relevant, but here is a summary of a few points:

For this particular analysis, work on answering simple questions first, which presumably, the “experiment” intended to address directly and then move on to more secondary questions. This is one suggestion:

1. What is the relationship between leaching and N rate? A: it appears as it is nonlinear and increasing for corn and mostly linear for soybean. This can be described (at a first stage) with either an exponential, bilinear or expolinear function. (Others?)
2. What is the effect of the cropping system on the parameters of the nonlinear model? This is in part answered by the anova table, but ‘a’ and ‘b’ are similar, ‘c’ is clearly higher for corn and ‘xs’ seems more clearly defined for corn than for soybean. (This description is very brief. It could be made more precise from the output of the emmeans analysis).
3. How much variability there is around the relationship between leaching and N rate? This could be addressed using bootstrap, which I only \***started**\* to address with the plots in which I used ribbons.
4. How much variability is caused by the ‘sites’ and does it affect the parameters of the model?
5. After you expand on these *relatively* simple questions you can start to address more derived and speculative questions which the “experiment” was not initially designed for, such as variables or factors which \***might**\* help understand the variability in the inflection point and the slope ‘c’.

Personally, I would start to worry about question 5 after I understand questions 1-4. So this is my input for this specific analysis. This is a conversation, however, refining questions 1-4 is important and I’m making assumptions about what are the research questions behind these simulations. As you can see, if you change the research questions, the analysis might change, so it is impossible to say ‘Here!’ this is the R code that solves your problem… it does not work that way.

In terms of other things I said. I believe that in our field students are not exposed enough to NLME or LME at a level relevant to the analysis they need to conduct. For NLME, we have used them in many papers and they appear every time we care about the relationship between ‘y’ and ‘x’ and this relationship is not a straight line. This happens almost all the time in biology, ecology, agronomy, etc. So I don’t think you we are being “selfish” by choosing this topic. This the main concept I will try to emphasize this Friday.

So in the end, my suggestion is that you work on answering 1-4 (your modified version of this) and then send this as a report with further questions. I can help you at any stage. In particular I need to write the code for the bootstrap.

This is all for now.