**The idea is that when we are trying to model the effect, the foliar-penalty should be linked to the amount of residue on the surface.**

 Yes – the theory is greater surface residue = more foliar disease because of more inoculum (<https://www.cabdirect.org/cabdirect/abstract/19932329073>). A national project started earlier this year to further investigate this, but for the time being lets stick with more residue = more disease (particularly when weather is favorable for the disease).

**The seedling disease should be related to both the biophysical environment (which is indirectly affected by residue on the surface, regardless of the type of residue)**

yes – surface residue of any kind means soil temperatures don’t warm as much and they tend to be wetter.

Regarding incorporated residue – in the olden days tillage was a recommended disease management recommendation because burying usually = less disease.  This is because many of the pathogens that survive in the residue do not compete well with microbes that are decomposing the residue so pathogen populations decrease.

Having said that however, there are probably some stalk rot fungi, like Fusarium species, that may survive okay. Plus I guess some of the pathogens that cause seedling disease and stalk rots form survival structures (oospores for Pythium and chlamydospores for Fusarium).  I am a little hesitant about ear rots – I would think surface residue would be more important since most infections occur through the silks or damage to the kernels and thus have to come from spores blowing around.

So going back to your flow chart above – I think

surface residue -> seedling, leaf, stalk and ear disease

incorporated residue -> seedling and stalk