Release Notes – Overseer version 6.5.0 (Deeper Rooted Plants)

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Introduction

Description

Overseer currently assumes that crops and pasture will only uptake nitrogen from the top 600 mm of soil. While this assumption was appropriate for the majority of modelled scenarios in OverseerFM, it did not account for the total N update (and thus leaching) for many crop and pasture species with a root depth below 600 mm.

This release is an update to the Overseer model, developed together with Plant & Food Research (Dr Hamish Brown) to account for N uptake (crop N uptake) below 600 mm. This update is visually depicted in Figure 1.

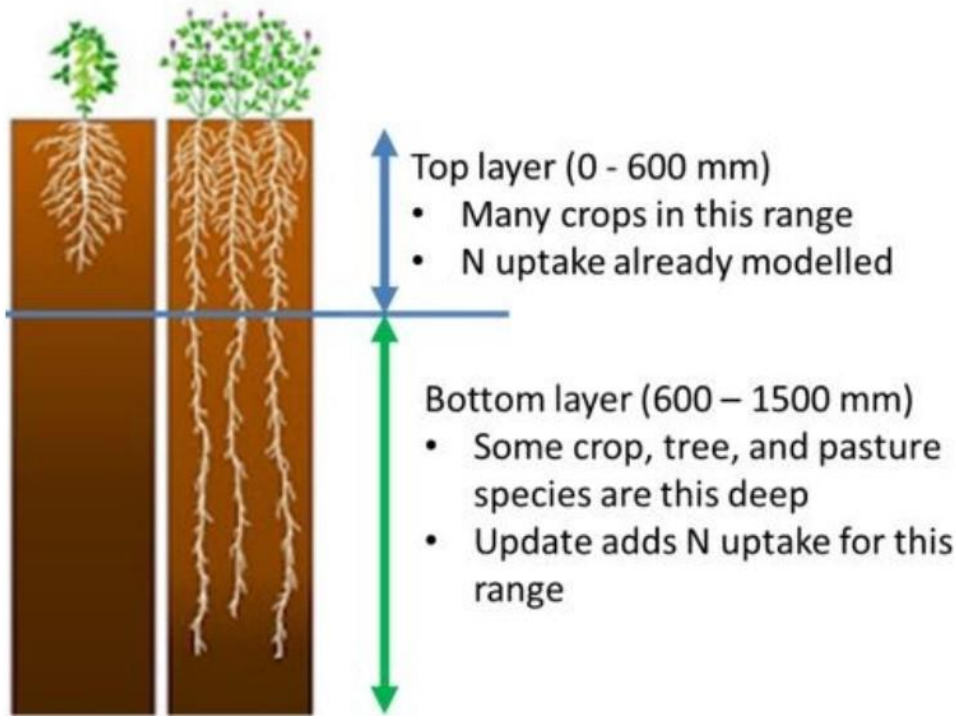


Figure 1: Visual representation of what area of the root nitrogen uptake will be added with this OverseerFM model update.

While this update accounts for the N uptake occurring below 600 mm, N uptake in the bottom layer is dependent on plant nutrient requirements not being met in the top layer (0-600 mm). This means N uptake below 600 mm will only occur when the crop or pasture species cannot obtain all required nutrients in the top layer and when these nutrients are available in the lower soil layer (600-1500 mm). It should be noted that although many farms may have deeper rooted plants, there will likely be minimal or no change in the total N leaching when there is sufficient nitrogen in the top 600 mm of soil.

Advantages/benefits

This update provides representation of N uptake below 600 mm for crop and pasture species with a root depth down to 1500 mm, which may lower N leaching estimates for farms growing deeper rooted crops or pasture. For some farms, this update will mean a drop in modelled N leaching, but for most there will be minimal to no change (as shown in the impact below).

Overall impact

The impact on modelled results for the deeper-rooted plants update has been checked for every farm account in OverseerFM. The impact of the changes is outlined below.

The following graphs in figures 2-4 show the combined impact of model release 6.5.0 on N, P, and GHG results. We have run every year-end analysis, publication and scenario (over 120,000 analyses in total), through the new 6.5.0 version of the model, then we have compared the new results against the previous 6.4.3 model version. The charts below illustrate the impact of the change on the 19,023 year-end analyses currently within OverseerFM, as these analyses are most likely to represent a real farm system.

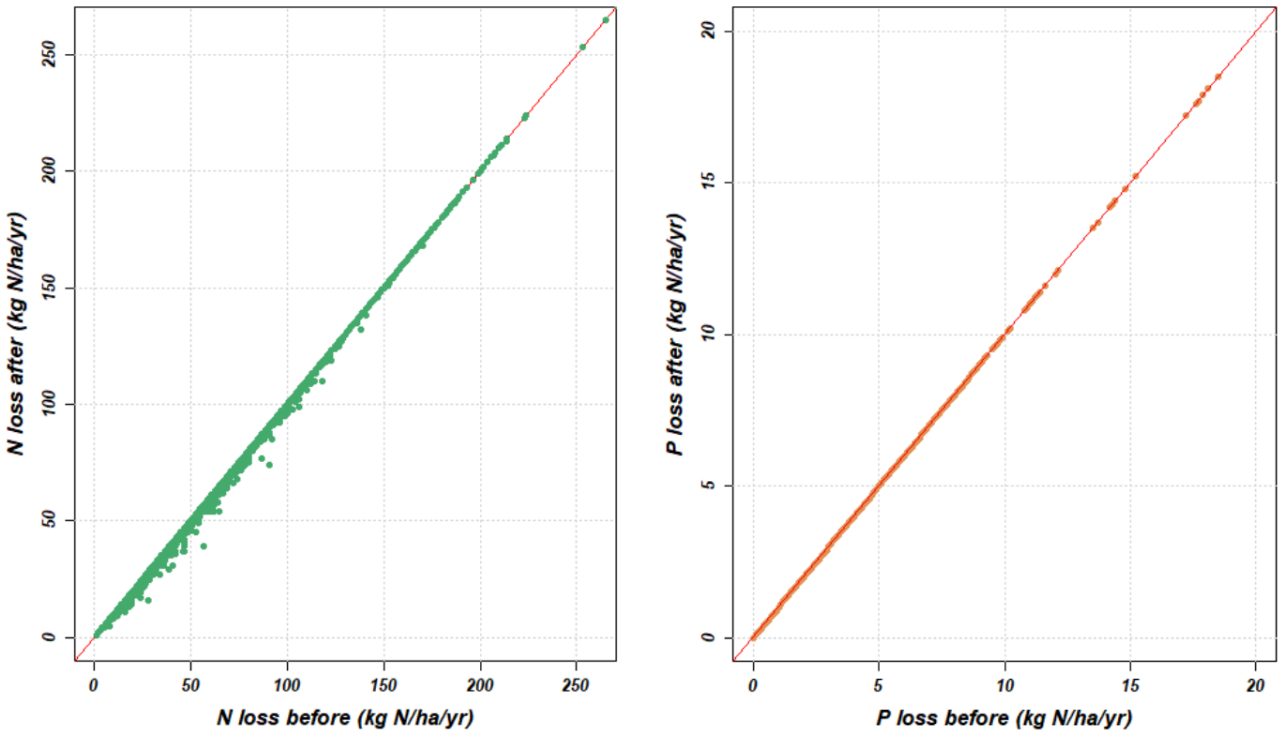


Figure 2: Loss (kg/Ha/yr) with vs without deeper rooted plant update for N (left) and P (right).

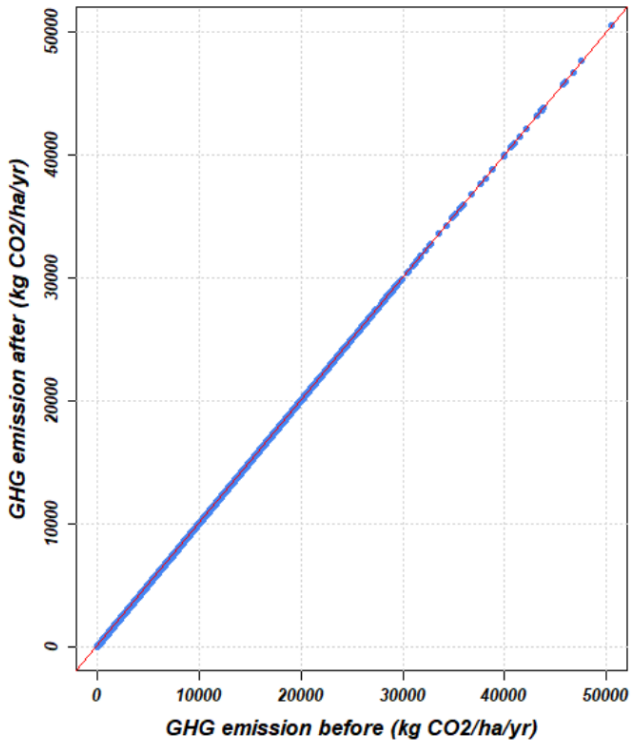
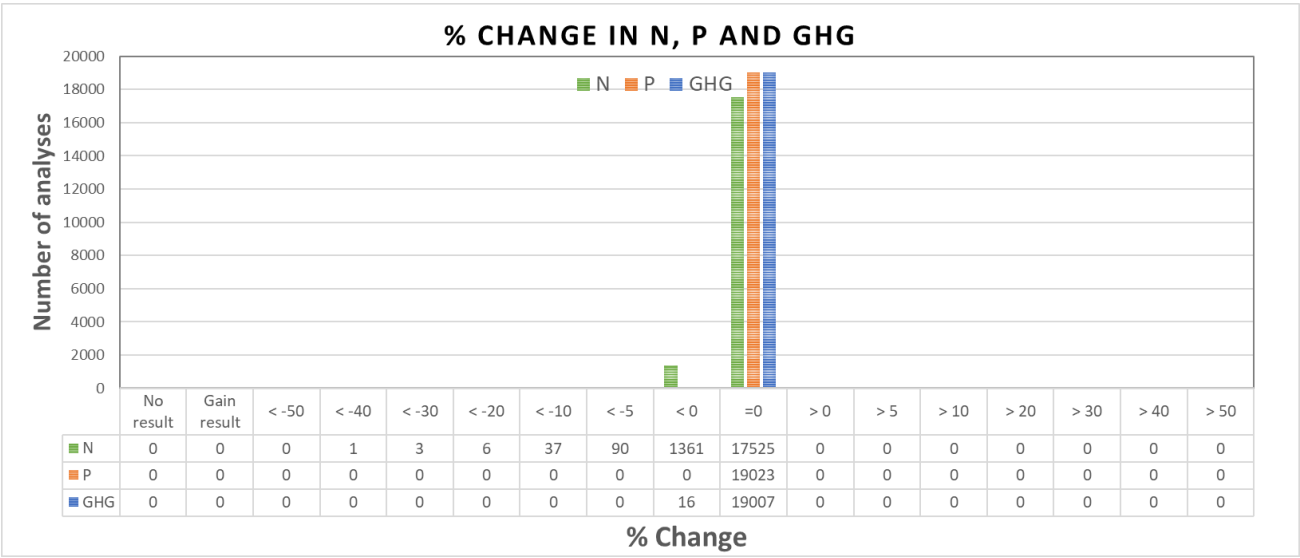


Figure 3: GHG loss (kg/Ha/yr) with vs without deeper rooted plant update.



	No result	Gain result	< -50	< -40	< -30	< -20	< -10	< -5	< 0	=0	> 0	> 5	> 10	> 20	> 30	> 40	> 50
N	0	0	0	1	3	6	37	90	1361	17525	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	19023	0	0	0	0	0	0	0
GHG	0	0	0	0	0	0	0	0	16	19007	0	0	0	0	0	0	0

Figure 4: Bar graph showing the number of analyses per % change group for N (green), P (orange), and GHG (blue).

As seen in Figures 2-4, the impact of the change is minimal where a small number of farms see a minor percentage drop in N leaching, with even fewer seeing a minor percentage drop in GHG emissions and no change in P loss. The result from this impact testing is as expected, as there are limited cases where N update below 600 mm will occur.

What may have made my results change

How do I know if my farm is affected by the use of deeper-rooted plants?

If you'd like to know if your previous or current farm analyses are impacted by deeper-rooted plants, you can simply look at the 6.5.0 release impact information for the specific analyses in the analyses audit log in OverseerFM.

Why has my N leaching or GHG emissions number gone down?

For this update to impact a farm's N leaching number, it means the farm must meet *all* the following criteria:

- The farm has a crop or pasture species present that are estimated to have roots that have grown lower than 600 mm into the soil (i.e., there is a deeper-rooted crop or pasture).
- Where the deeper-rooted crop or pasture species is present, it cannot consume sufficient nutrients from the top 600 mm of soil (e.g., little or no fertiliser applied to a high yielding crop).
- There are nutrients available in the bottom 600-1500 mm of soil for uptake by the deeper-rooted crop or pasture. (e.g., high mineral N in the soil before planting a crop).

I have deeper rooted plants on my farm, why has my N leaching number not changed?

If a farm has a deeper-rooted crop or pasture(s) present but the update didn't result in a decrease in N leaching or GHG emissions this means that, as modelled, this farm did not meet one or more of the criteria bullet-pointed above.

What crops and pastures are considered deeper-rooted?

Maize, Oats, Wheat, Hemp, Rape, Barley, Sweetcorn, Sunflowers, Cocksfoot, Broad beans, Ryegrass, Clover, Pakchoi, Beans, Green beans, Lentils, Peas, Ryecorn**,** Triticale, Fodder Beets, Kale, Forage barley, Forage oats, Forage wheat, Swedes, Turnips, Brassica, Lupins, Mustard, Phacelia, and Lucerne.