



POTASH NEWS

July 2021

P&K Balances

The figures for P&K balances over the last five years in England and Wales show an interesting trend. On the surface, there doesn't appear to be too much concern when looking at the difference between the nutrients removed by crops, and what is applied to those crops annually. On fields where these inputs are applied (Figure 1 a&b),

for winter wheat, winter barley and oilseed rape there is some fluctuation around 0 (where the offtakes by the crop match the inputs applied to that crop). The story for potash is possibly slightly more concerning than it is for phosphate, particularly for winter cereals, however across a rotation this may average out.

Figure 1a. Phosphate Balances (On fields where applied) Eng & Wal 2015-2019

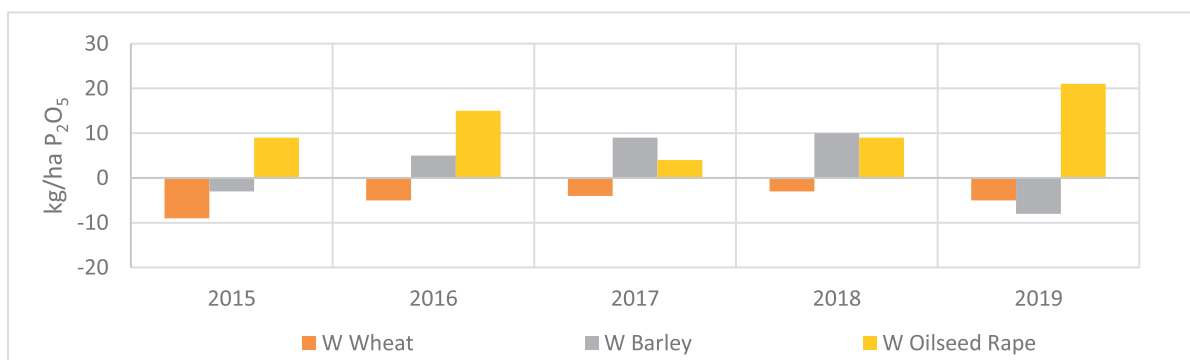
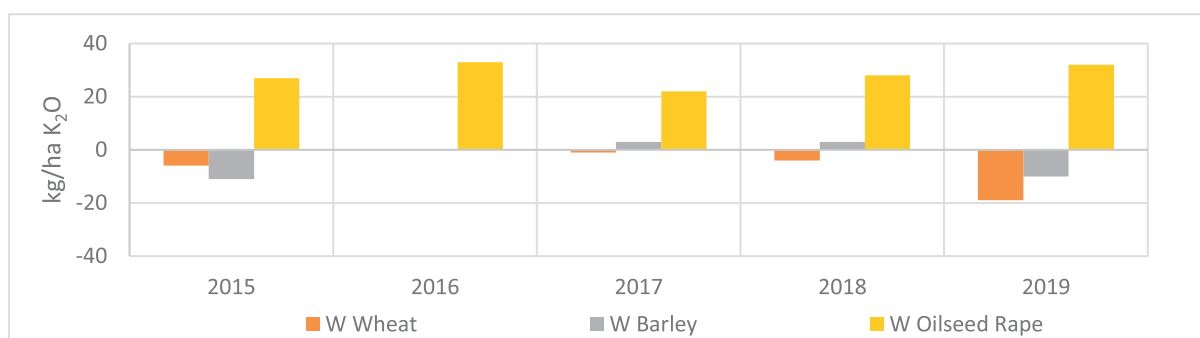


Figure 1b. Potash Balances (On fields where applied) Eng & Wal 2015-2019



However, this is only part of the story. The figures used in this calculation only account for the balances on fields where phosphate and potash applications were made. When looking at the bigger picture, including fields where no applications were made (Figure 2 a&b), the overall balances are more dramatically negative. These figures do not account for any manures that are applied, which will improve the situation slightly, however, this will in no way account for the full difference.

This data suggests that when applications are made to crops, the appropriate rates are applied. Which must mean that there are a significant proportion of crops that are not receiving any inputs. A small proportion of these may well be at the higher indices, where no applications are justified in order to run down the index, but there will be a much larger proportion that are at or below the target index and which therefore require applications to maintain or build soil indices.

Figure 2a. Phosphate Balances (all fields) Eng & Wal 2015-2019

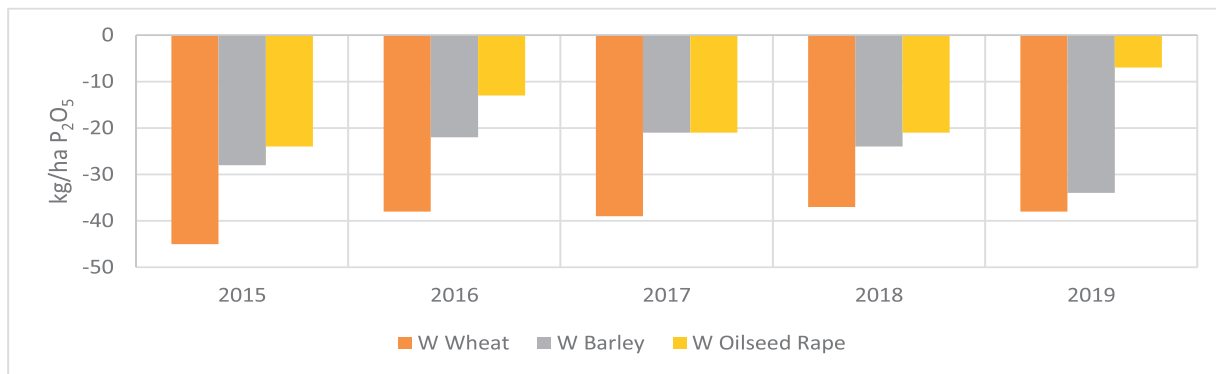
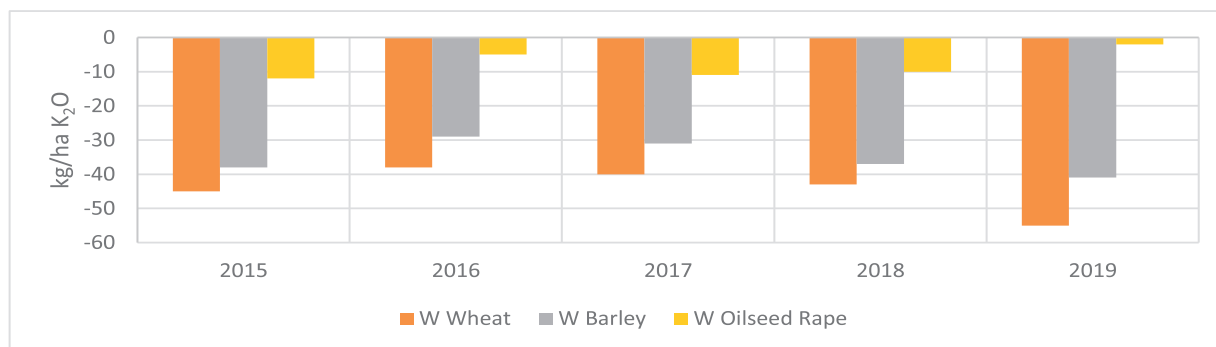


Figure 2b. Potash Balances (all fields) Eng & Wal 2015-2019



Establishment issues last autumn?

It is fair to say that for large parts of the country, the last two autumns have been challenging for crop establishment. It is easy to look at poorly established areas and park the blame for this with the weather. With an evidently changing climate, it may be worth considering the problems in more detail. Cultivation strategy, machinery trafficking and drilling dates are all likely to have had an impact alongside the challenging weather conditions, but could some of the answers lie further underground? It is commonly accepted that phosphate is important for crop establishment. This essential nutrient has very low mobility in soils, and, with small root systems from establishing plants, any deficit of soil phosphate will be exacerbated in a difficult autumn. Where soils are at the target index it should be remembered that maintenance applications are still required, to supply the level of nutrient that is removed by the crop. If soils

that are at target do not receive applications over the rotation in order to account for these removals, then depending on yields and crop rotations, well in excess of 200kg/ha of both P&K could be removed before soils are resampled.

Crops showing signs of stress in spring?

The last three springs have all seen periods of extended dry, leading to increasing soil moisture deficits (Figure 3), which have had an impact on crops. This season was probably the most pronounced, with very few crops escaping the signs of stress at some point during April. Establishment of spring crops has been challenging due to low levels of moisture around the seed, whilst winter crops have suffered from drought stress and nutrient deficiencies due to low levels of available soil moisture. This has impacted both the availability of nutrients within the soil, but more significantly, the availability of nutrients applied to the surface (particularly spring applied nitrogen this season).

Figure 3. Average Soil Moisture Deficit (Northamptonshire 2019-2021)



Was there anything that could have been done to help combat this stress?

Due to the similar weather patterns, the same message has been delivered each year regarding the requirement for crops to be sufficiently supplied with potassium. Potassium has a well-known role in regulating water relations in plants. Dissolved in water inside cells, it raises the osmotic potential and so promotes water movement into the cell. The production and expansion of new cells as the crop grows in the spring will be limited if there is an insufficient concentration of potassium near the roots in drying soil. 'Pumped-up' by water, the cell has structural strength (turgor) and this gives rigidity to leaves and other plant tissues. If the potassium concentration decreases, the tendency of water to move into the cell reduces and the plant loses rigidity and wilts.

As conditions lead towards wilting, the first cells to be affected are usually those surrounding the small holes (stomata) in leaves through which carbon dioxide enters the leaf and water vapour leaves. As these cells lose strength, the stomata close and the resistance to carbon dioxide entry increases. Incipient wilting can reduce the rate of photosynthesis by restricting carbon dioxide supply.

Financial implications

In the current climate, there is no doubt significant financial pressures on many farm businesses, with low yielding crops from the difficult 2020 season causing some potential cash flow issues. Allied to that is the reduction of the Single Payment over the coming seasons, which is unlikely to be fully replaced by any environmental scheme. Cutting out unnecessary costs is clearly important regardless, but any decision to reduce inputs should be clearly thought out and the implications fully understood. Where soil indices are above the target index, there is scope to reduce phosphate and potash inputs, in order to run down overly high indices. However, if soils are at the target (and clearly if they are below

the target) any reduction in inputs compared to the maintenance dressing will only serve to erode the soil levels and create a bigger bill to rectify the situation in the future. This can be made worse depending on how quickly soil levels deplete, which will vary for different soils. Once they are at the target index, it is usually much more cost effective to maintain this level, than letting them become depleted and having to suffer the burden of building them back up to the target.

Opting not to apply P or K on any soils that are not above the target index for the crop being grown should not be seen as an easy win for cost saving. Soils that are well supplied with nutrient are fundamental to help buffer crops against any adverse weather conditions faced during the season. Attempting to rectify issues during the season can be unpredictable at best, especially considering the unreliable weather patterns that have occurred over the last few seasons. Phosphate and potash removed from a field at harvest has a measurable cost; even if it was not applied as a dressing to the crop, it will have come from the reserve in the soil, thus effectively reducing the capital value of this asset.

Although the days of yield being king appear to be over, where an investment has been made to plant a crop, an economically optimal yield will always be the aim. These crops will require sufficient quantities of all nutrients for growth, which in the case of potash, is significantly greater than the amounts that are removed at harvest. Maintaining soils at the target index is the safest way to ensure these crops are able to access the required quantities at the appropriate times to optimise growth, yield and therefore financial returns.

