

Want better value from your fertiliser? Soil sampling is key

Mark Plunkett
Johnstown Castle Research Centre.



Phosphorus (P) and potassium (K) fertilisers have doubled in price and nitrogen (N) is four times more expensive than recent years. Indications are that prices may remain high, with supply issues due to the Russia and Ukraine conflict.

Using fertiliser efficiently is central to maintaining profitable production levels while reducing their impact on the environment. Efficiency includes identifying the correct requirements, choosing the most effective products and applying them accurately.

It's vital to know where you are starting from. The coming weeks are the ideal time to assess soil fertility and create your fertiliser and farm lime strategy.

Fertiliser use statistics for the first two quarters of 2022 show that fertiliser N applications have increased by around 13%, while P and K applications have reduced by around 7% and 13%, respectively.

While this approach may curtail farm fertiliser input costs in the short-term, over time it will reduce the productivity of our soils.

Most importantly, inadequate P and K levels or low pH can reduce the efficiency with which plants use expensive fertiliser N.

Soil fertility and N efficiency

Maintaining optimum soil fertility increases the efficiency of applied N from 35% on low fertility fields to 63% on fields with optimum pH, P and K – see Figure 1.

Correcting soil pH alone will result in an improvement in N efficiency from 35% to 53% where soil P and K is sub-optimal (see Figure 1).

Maintaining optimum levels of soil P and K increases N efficiency from 53% to 63%. With record fertiliser N prices and possible limits on supplies, maintaining the correct soil



pH, P and K will ensure the efficient use and maximum return from each kilo of N applied.

For example, for every 100kg N/ha of applied fertiliser N to soils with sub-optimal pH, P and K, 35kg N/ha will be available to grow grass. At optimum soil fertility, 63kg N/ha will be available to grow grass. Optimising soil fertility gives you the opportunity to reduce fertiliser N rates and costs.

Time for soil sampling

Now is the ideal time to identify the areas of your farm that require up-to-date soil analysis and aim to have soil samples taken over the coming

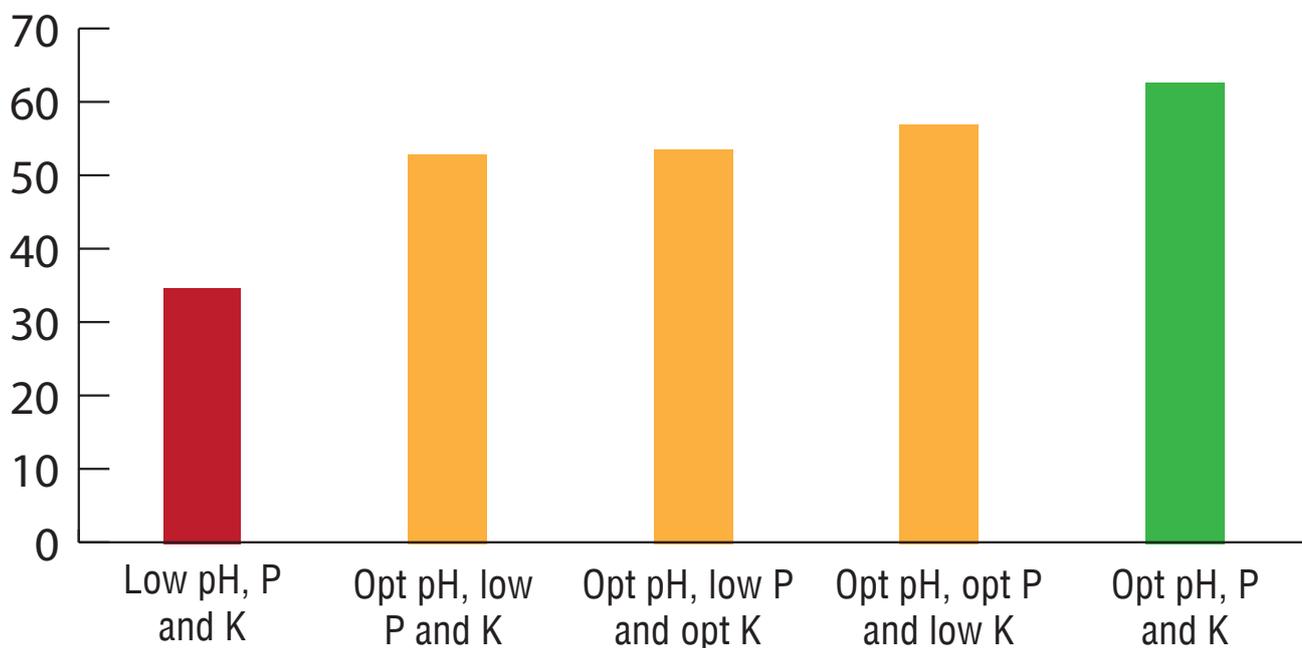
weeks/months. This is vital information needed to manage fertiliser costs for 2023.

Taking soil samples will provide a good foundation for planning the application of lime, slurry/farm-yard manure (FYM) and fertilisers. A standard (pH, LR, P and K) soil sample costs €1.25/ha/year, while the cost of a single kg of P is currently around €4.50/kg.

Take a good soil sample

It is essential that soils are sampled correctly. Samples should be taken with a suitable soil corer to the correct sampling depth of 10cm. Care is

Figure 1: Soil fertility and optimum N use efficiency.



needed as soil results taken today will be the basis for nutrient applications over the next four to five years on your farm.

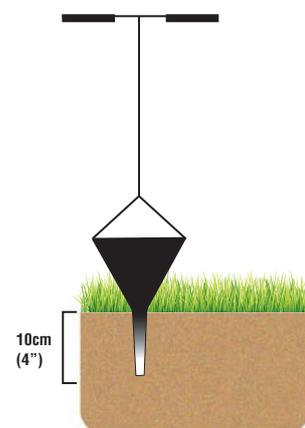
Soil P accumulates in the top few centimetres of soil in grassland. Therefore, incorrect sampling depth will result in an inaccurate soil P reading, especially when sampling is too shallow.

For soil test results to be comparable over time, they must be sampled to the correct depth on each sampling occasion. Therefore, ensure that soils are sampled to the correct depth, only take samples under suitable soil conditions that allow for full depth coring.

Guidelines for taking a soil sample

- Take at least one sample for an area of 2-4ha.
- Take representative soil samples (by following a 'W' soil sampling pattern). Avoid following lines of regular machinery traffic or tramlines.
- Avoid unusual spots such as where there are old field boundaries etc.
- Sample the top 10cm of soil with a suitable soil corer.
- Leave three to six months between sampling and P and K applications.
- Leave two years between sampling and lime application.
- Take approximately 20 cores to make up the soil sample.
- Prepare a soil sampling map and label your samples.

Figure 2: Ensure correct soil sampling depth for accurate soil P reading.



Soil fertility trends

A recent review of soil sample results from 2021 indicate that in the last two years, soils with optimum soil fertility (pH over 6.2 and soil P and K index 3 or 4) on grassland farms has slipped from 20% to 15%.

In the previous three years (2016-2019), soils with optimum soil fertility increased from 8% to 20%. The decline in soil fertility in the last two years is due to an increase in the percentage of soils at P and K index 1 and 2.

Soil pH levels have also declined, with the percentage of soils at a pH less than 6.2 has increased from 41 to 49%.

On tillage farms a similar trend has occurred in the last year with the percentage of soils with optimum soil fertility (pH >6.5 and soil P and K index 3 or 4) dropping from 24% to 18%.

In the previous six years (2014 to 2020) soils with optimum soil fertility

increased from 12% to 24%.

The recent decline in soil fertility is due to a slight increase in soils testing at P index 1 and 2, while soil K levels have continued to improve. Soil pH levels show that the percentage of soils pH <6.5 has increased from 27% to 39%.

The above trend may be due to a new soil sampling cycle in the last two years on grassland farms and last year on tillage farms, but highlights that a large proportion of our soils are deficient in major nutrients such as lime, P and K.

Lime applications were the highest (1.33m) in 2021 since the 1980s and optimum soil pH is key to efficient use of fertilisers. Maintaining a balanced nutrient supply (pH, P and K) during the growing season will be vital.

Test your soils over the coming weeks and months to plan your farm nutrients requirements for 2023.

National soil fertility trends

In 2021, Teagasc analysed a total of 33,876 soil samples from dairy, dry-stock and tillage enterprises. Overall, soil sample numbers increased by 13% in 2021. There were 30,082 grassland soil samples taken. Of the total, 21,049 were taken on dairy farms, which represents an increase of 11% compared to 2020.

Only 16% (about one in six) dairy farm soils tested were optimum for pH, P and K. The following is a summary of the main changes for soil pH, phosphorus P and K in 2021 on dairy farms.

Dairy

- 6% of soils have optimum pH, P and K (3% decrease).
- 53% of soils with a soil pH >6.2 (10% decrease).
- 55% of soils at P index 1 and 2 (4% increase).
- 48% of soils at K index 1 and 2 (no change).