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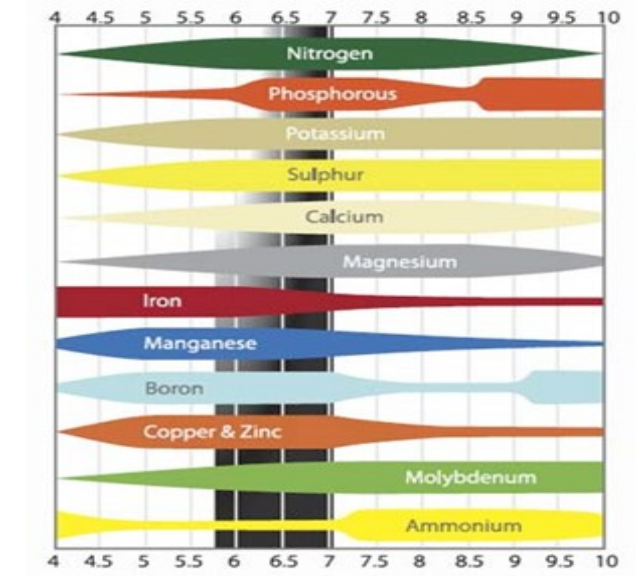
Soil Analysis Results and Interpretation

Determining the soil nutrient status for pH, phosphorous and potash by regular soil testing means that nutrient applications can be carefully targeted to meet crop requirements whilst eliminating the cost and environmental risk of unnecessary applications.

pH & Liming

When applying nutrients it is essential that soils are at the correct pH as this ensures optimum uptake of nutrients helping to achieve optimum yields and consistent quality (see Figure 1 below).

Figure 1: pH and nutrient uptake



The recommended pH for mineral soils is 6 for permanent grassland and 6.5 for continuous arable cropping. pH values below 6 cause the solubility of phosphoric acid, calcium and magnesium to drop. If they are less soluble then plant uptake isn't as efficient and the crop suffers.

Liming Recommendations

Several of your fields are slightly below the optimum pH for your soil type and cropping namely Cowslip and Primrose Field. Consider applying lime to these fields over the next couple of years following recommendations in your nutrient management plan. Lime can be applied at any time throughout the year when ground conditions are suitable; spring applications are generally preferred as some leaching can occur over the winter. It is important to allow sufficient time for the soil to adjust to the correct pH before sowing. This can take several weeks depending upon the quality of the lime used.

Phosphorus

There is a powerful interplay between minerals, where one mineral can affect the uptake of several others, either positively or negatively. Excesses of one mineral on your farm, can negatively affect the uptake of several others. **Phosphate** is a good example; high phosphate indices of 4-5 can inadvertently shut down the uptake of calcium, potassium, zinc, iron and copper. Calcium and copper are critical for disease resistance in all plants including grass and maize.

Typically the maximum yield of both arable crops and grass is reached at Index 2 for phosphorus. Your fertiliser policy should aim to maintain the soil at this target index. You should target future organic manure applications towards fields with the lowest P index and try to avoid spreading organic manure on any field with a P index of 3 or above as this can lead to phosphate being leached from the soil into nearby watercourses.

Your recent analysis shows that Smithy Field and 6 acre Square have P indies of 4 & 3 respectively. Try to avoid large organic manure applications on these fields and target them towards Jeffs, Broughton Lee & Rodgers which are at P index 1. Maintenance applications should be applied to the rest of the tested fields which were at index 2.

Potassium

The maximum yield of both arable crops and grass is reached at Index 2- for potassium. Where fields are below the recommended level at Index 1 (Jeffs, Peaks, Broughton Lee & Bailey), you should aim to build the levels of K in these fields by supplying more K than the crop requires. Additions of straw based muck supplies good quantities of potash and should be targeted at these fields. If no solid muck is available consider an inorganic K fertiliser. When fields reach index 2+, maintenance dressings of K should be applied.

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Magnesium

The optimum magnesium index for most soils is 2, however some soil types are naturally high in magnesium. It is important to maintain adequate levels of magnesium in grass herbage to help minimise the risk of hypomagnesaemia in livestock (Grass staggers) or potash deficiency in crops. It is also recommended that you test your magnesium to calcium ratio within soils, particularly if you are suffering from waterlogging. Magnesium causes the soil particles to bind together, whereas calcium encourages particles to separate. A good ratio of calcium to magnesium allows the soil to have adequate aeration and drainage. High magnesium soils can be harder to work. In this case, applications of calcium lime are advisable, rather than magnesium lime sources. All of your soils have a high Mg index of 4 or 5 and testing the Mg:Ca ratio is recommended.

Sulphur

Sulphur is an important crop nutrient that is needed in similar amounts to phosphorus. Sulphur is essential for the formation of amino acids, the building blocks for proteins which are needed for growth and development in plants. Sulphur is required to convert Nitrogen to plant dry matter. As crops grow both Sulphur and Nitrogen are used together so a Sulphur deficiency will decrease nitrogen use efficiency, reduce yield and increase the risk of nitrates leaching from the soil into nearby ground or surface waters.

Historically atmospheric sulphur deposits have provided an adequate supply, however, in recent years atmospheric deposition has declined and consequently crops should be monitored for signs of sulphur deficiency, especially sensitive crops such as oil seed rape and grass silage. A deficiency is more likely in second and later silage cuts, especially on sandy or shallow soils, or where manures are not regularly applied. A plant tissue sample is required to test for deficiency and should be sent to a lab for analysis.

Where a sulphur deficiency is indicated you should follow RB209 recommendations.

How to take a soil sample

As a general rule soils should be sampled every 3/4 years. It is good practice to divide your farm up into 4, sampling a quarter each year. Samples should be taken before applications of fertiliser or organic manure. If necessary to take after a treatment, a minimum period of at least 3 weeks should be left before the sample is taken.

As a rule of thumb—sample as deeply as the soil you are managing. For cultivated soils this is typically 0-15cm and for permanent grassland 0 – 7.5cm. When sampling for general monitoring at least 25 sub-samples should be taken across the field following a 'W' pattern. Samples should then be mixed and a representative sample of the whole field sent to the lab for analysis. Avoid anomalous areas such as gateways, tramlines, waterlogged areas and beneath trees.

Further Information

Fertiliser Manual RB209 (Defra, 2010) Available to download from http://www.ahdb.org.uk/projects/CropNutrition.aspx

Soil Sampling
PAAG soil sampling guide http://www.nutrientmanagement.org/library/sampling/

AHDB Resources
EBLEX Better Returns: Managing Nutrients for Better Returns.
EBLEX Better Returns Plus+ : Trace Element Supplementation of Beef Cattle and Sheep

Case Studies
Prosoils Project http://www.prosoilproject.uk/