How much P and K is required for cereals?

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Completing a farm fertiliser plan based on recent soil analysis is the first step in calculating crop P and K requirements for 2022. This task is essential if you aim to protect your cereal margins.

Soil fertility

Up-to-date soil analysis, at the modest cost of €0.50c/ac (pH, LR, P and K), provides the basis for your P and K strategy for cereal crops.

The next step is to maximise the availability of soil major nutrients and your return on investment from expensive P and K by making sure soils are at pH 6.5-6.8.

For spring crops, apply lime as per the soil test report to correct soil pH levels to pH 6.5.

Role of P and K

Phosphorus (P) and potassium (K) have many roles in cereal crop nutrition, from rooting to facilitating N use efficiency.

To maximise the return from applied N, it is very important to ensure the crop has a balanced supply of major (P, K and S) and minor nutrients (Cu, Mn and Zn).

For example, P is very important for rooting and tillering (see Figure 1), especially in spring cereals, while K is very important for straw strength and plant resistance to diseases such as powdery mildew.

Soil P and K index strategy in 2022

It will be very tempting to reduce or omit P and K in 2022 to control production costs. It would instead be prudent to tailor P and K rates based on soil test results. The soil P and K index (1 to 4) shows the soil's ability to supply P and K during the growing season – see Table 1.

Soils with higher indexes (3 or 4) will have a greater nutrient supply and produce higher grain yields.

Soils at index 1 and 2 will be the most responsive to applied P and K, as they have only a very low to low P and K supply. These soils will have higher P and K requirements as the supply from the soil will be lower.

For spring cereals, where possible, combine drill P at sowing time to increase the efficiency of applied P fertiliser. It will be important to fertilise these soils to their expected grain yield potential.

But, in order to control fertiliser costs, omit P and K applications aimed at building up soil levels. We can build up soil P and K levels in years when fertiliser is more affordable.

Soils at index 3 have a good nutrient supply. Aim to replace P and K removed at harvest time to maintain soil fertility in the optimum range (index 3).

Again, it is important to crop yield potential to maintain soil fertility levels. These crops will use N most efficiently and produce the largest grain yields annually.

Omitting P and K will result in soil P and K levels declining, thus reducing grain yield potential in the years ahead.

For higher-yielding crops such as

The impact of combine drilling P on index 1 soils (very low P supply) on crop root and tiller development.

Table 1: Soil nutrient index, response and soil test range for P and K.

Index	Nutrient response	P (mg/l)	K (mg/l)
1	Definite	0 – 3.0	0 – 50
2	Likely	3.1 – 6.0	51 – 100
3	Unlikely/tenous	6.1 – 10	101 – 150
4	None	>10	>150

winter wheat, maintaining higher soil indexes produces higher grain yields. Soils at index 4 are very fertile and have a good supply of P and K to meet crop requirements during the growing season.

Up-to-date soil analysis will help identify these soils on the farm. This is useful information, as these fields don't need P and K.

The Teagasc soils database shows that 31% of tillage soils sampled were at index 4 for P and K in 2020 offering a major potential saving on P and K applications in 2022.

Table 2: P and K offtakes per tonne of grain yield (t/ha).

Crop Type	P (kg/t)	K (kg/t)	How to calculate P and K req. e.g spring barley
Winter wheat	3.8	10	Grain yield 7.5t/ha
Winter barley	3.8	10	
Winter oats	3.8	14.4	**P -** 7.5 x 3.8 = 29kg P/ha
Spring barley	3.8	11.4	
Spring wheat	3.8	11.4	**K -** 7.5 x 11.4 = 86kg/ha
Spring oats	3.8	14.4	kg/ha x 0.8 = units/ac

P and K advice

Over recent years, soil fertility levels have improved on tillage farms resulting in higher grain yields. To maintain profitable grain yields and hold soil fertility levels at their current levels, we recommend that you fertilise crops to their grain yield potential.

For example, take the average yield over the last three years to form the basis for calculating P and K requirements in 2022.

Table 2 shows the P and K offtakes for a range of cereal crops. Note the P removed is similar for all cereals, while the K levels differ depending on crop type.

See the example above showing how to calculate the P and K removed for a crop of spring barley.

Table 3 below shows the P and K advice for different cereal crops, based on average expected grain yields. In addition, suggested fertiliser products and rates are shown, which will deliver sufficient P and K.

Table 3: P and K requirements based on cereal crop grain yield (t/ha) for a range of cereal crops.

Crop Type	Grain yield (t/ha)	P kg/ha (units/ac)	K kg/ha (units/ac)	Suggested fertiliser product and rate (kg/ha) (bags/ac)
Winter wheat	11	42 (34)	110 (88)	495kg/ha (4 bags/ac 12-8-20)
Winter barley	10	38 (30)	100 (80)	460kg/ha (3.75 bags/ac 12-8-20)
Winter oats	9	34 (27)	130 (104)	495kg/ha (4 bags/ac 10-7-25)
Spring barley	7.5	29 (23)	86 (69)	425 kg 13-6-20 (3.5 bag/ac)
Spring wheat	8.5	32 (26)	97 (78)	495 kg 13-6-20 (4 bag/ac)
Spring oats	7.5	29 (23)	108 (86)	495 kg 13-6-20 (4 bag/ac)