



leaflet 13

The Potash Development Association

Oilseed Rape and Potash



Nutrient balance

Efficient crop nutrition requires the correct balance of all nutrients, and in principle individual plant foods should not be considered on their own. Nevertheless this leaflet discusses the importance of the nutrient potassium (K) because of its critical importance to the efficient use of nitrogen (N) which is widely covered elsewhere. Each year only about two thirds of the oilseed rape crop receives a dressing of potash (K_2O) fertiliser and if sufficient K is not available to the plant from the soil, yields will be reduced.

Functions of potash

The functions of potash in the oilseed rape plant are not necessarily visible or obvious but this nutrient is nevertheless vital for vigorous, healthy crop growth and profitable yields. In fact, more potash needs to be taken up by the plant than any other nutrient including nitrogen.

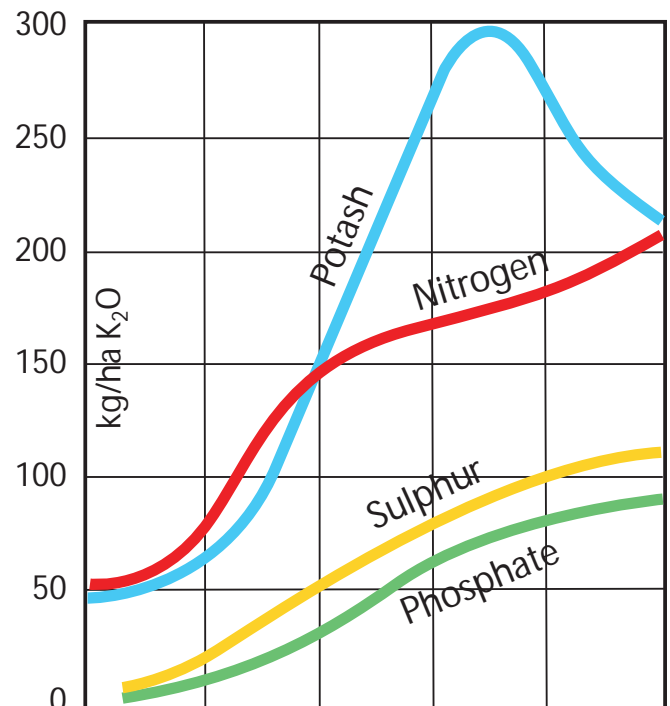
Potash is responsible for the transport mechanisms in the plant whereby materials made by photosynthesis in the leaf can be moved to other parts of the plant for growth, formation of seed and deposition of oil. It is vital in the water regulation of the plant and plays an important balancing role with nitrogen to ensure healthy, vigorous growth and natural resistance to disease, pests and stress.

Potassium deficiency

Deficiency symptoms are not commonly seen in the field but plants will suffer from potash limitation long before any visual effects on the leaf are apparent. General stress from drought, cold, water-logging, etc. will be aggravated if the plant is short of potassium and crops with better K supply will grow through such difficulties more satisfactorily. K deficiency can also be one reason for early lodging in crops.

Potassium deficiency causes browning of leaf margins.

Nutrient uptake for typical 3 t/ha oilseed rape crop



Uptake of potash

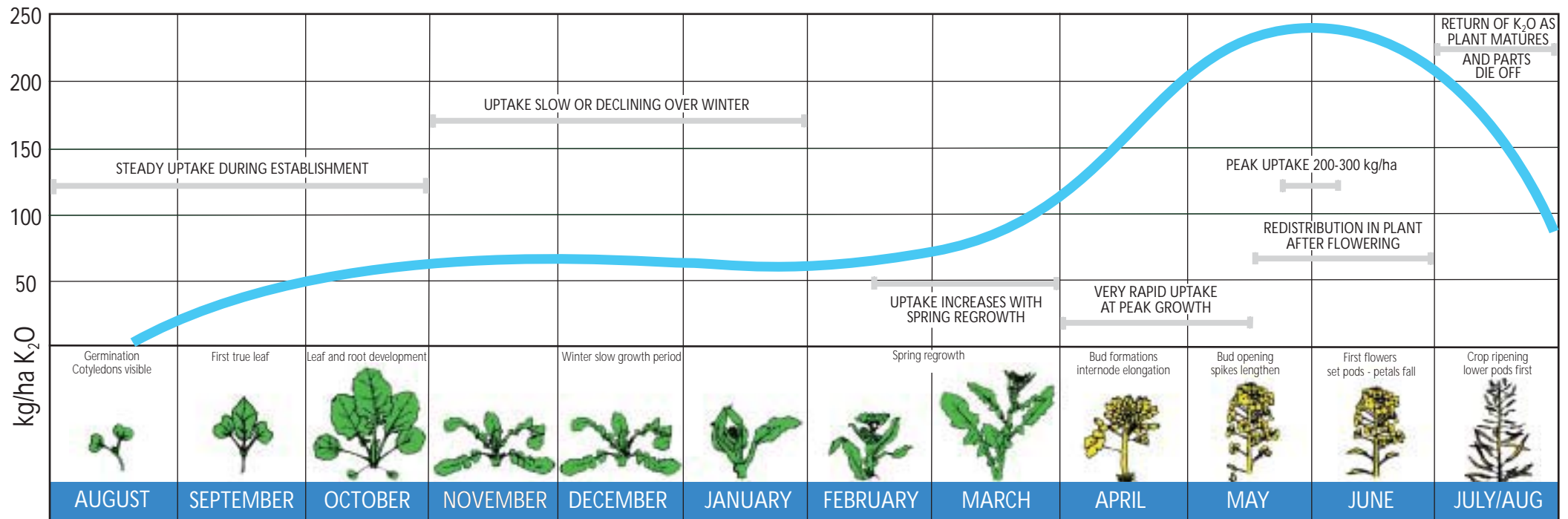
Potassium levels in the establishing plant are quite high at 3 - 4% and although the total bulk of the crop is fairly small, there will be around 60-75 kg/ha of potash K_2O in the crop by the end of autumn. Some forward crops have been found with levels of over 100 kg/ha by November. Over winter potash content is stable or may fall with leaf loss from frost, pest and disease effects.

The rate of growth and uptake requirement of oilseed rape plants in the spring is dramatic. Potash demand maybe in excess of 12 kg/ha/day. Where conditions for growth are not ideal (poor soil structure, thin soils, very wet or dry conditions etc.) the plant may not be able to extract its full needs even though the total quantity in the soil is theoretically sufficient. Continental fertiliser recommendations tend to be more generous than in the UK in order to ensure that the peak supply is adequate for optimum potential growth and yield. As with cereals, a spring top-dressing with an NK fertiliser will be worthwhile if the K available from soil reserves is insufficient (see leaflet 22, NK Arable Top Dressing).

Maximum uptake normally corresponds with the end of flowering when a crop will contain around 250 kg K_2O /ha. Peak uptake levels of 440 kg/ha have been recorded with high yielding crops. After seed set, potash in seed and pod continues to increase whilst leaf and stem content falls.

Soil K fertility must be maintained at a level which does not restrict this large and rapid uptake. The target soil index for oilseed rape for maximum yield is 2- (121-180 mg K/litre).

Potash uptake throughout the season (by winter rape)



Potash offtakes

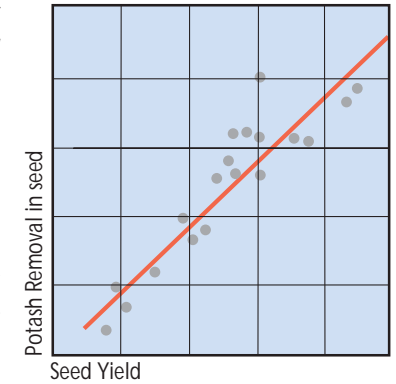
The yield of seed is closely related to the total dry matter production and because the % K between different healthy crops does not vary greatly it follows that total potash removal (offtake) is directly related to yield. Higher yielding crops take up more potash and where more nitrogen is used to achieve higher yields potash removal is increased.

The % K content of a healthy crop declines during growth from around 3-4% in the young plant to 2% at flowering. The seed itself contains only around 1-1.2% K. The amount of potash actually removed in the seed at harvest therefore represents only a very small proportion of the total potash which was in the growing crop.

Typically 11 kg K_2O /ha are removed for every tonne of seed harvested. However the offtake rises to 17.5 kg K_2O /ha per tonne of seed harvested if the rape straw is also removed from the field.

As a guide, a 4.0 t/ha winter oilseed rape crop harvested for seed only will remove approximately 45 kg K_2O /ha ($4 \times 11 = 44$). If the straw is also removed, the crop offtake increases to just over 70 kg K_2O /ha ($4 \times 17.5 = 70$).

Potash removal and yield



Response to potash

Uptake and removal should not be confused with response. Whilst oilseed rape takes up large quantities of potash, UK trials have not often shown yield responses. However, little yield response work has been done in recent years with new higher-yielding varieties.

Whilst potash is known to improve oil content in a range of other crops, no relationship has been found in this country with oilseed rape field trials although pot experiments have shown an increase in oil content of winter oilseed rape with increasing rates of potash fertiliser.

Potash recommendations

Soil analysis is an essential management tool and regular soil sampling should be carried out every 3 to 5 years. Both the actual soil index as well as any charges should be considered.

Soil K fertility should be maintained at least at index 2-(121-180 mg K/litre). At this target index, sufficient potash should be applied to replace that removed in the harvested crop, i.e. the crop offtake. This is termed the maintenance (M) rate of application. General values can be used as shown in the following Table, or more appropriately the maintenance application rate can be calculated from the known yield and offtake, as previously worked out for a 4 t/ha winter oilseed rape crop.

Where soil K index levels are below 2-, a 'build up' policy should be followed to raise low fertility soils back to the target index. The general recommendation is to increase the potash application rate, over and above the maintenance dressing, by 60 and 30 kg K₂O/ha for soil K index 0 and 1 respectively. However it is important for yield and crop quality that a deficiency of K in the soil is corrected with as little delay as possible and larger dressings will be more effective. It will be more appropriate to consider the cost of such 'build-up' dressings as a 'capital' improvement rather than as a variable cost set against the crop. Where the soil index is well above the target index of 2- reductions in rates of application are possible.

K Index	0	1	2-	2+	3 and above
Winter OSR (3.5 t/ha) (kg K ₂ O/ha)	100	70	40(M)	20	0
Spring OSR (2 t/ha) (kg K ₂ O/ha)	80	50	20(M)	0	0

Time of application

Where soil reserves are satisfactory, e.g. index 2 or more timing of potash application is not critical. For soils of K index 0 and 1, potash is best applied in the seedbed. Early spring top dressing with potash may have some merit where availability of K for peak spring growth may be limiting, on light soils where some leaching of K over-winter is possible, or where other management or buying advantages are obtained.

Other PDA leaflets

The PDA produces a range of leaflets relating to potash and its use. These clear and informative publications can be ordered, viewed and downloaded as PDF files from the PDA website.

www.pda.org.uk/potash-leaflets



FOR MORE INFORMATION AND CONTACT DETAILS SEE THE PDA WEBSITE

www.pda.org.uk



The Potash Development Association is an independent technical organisation formed to support the efficient use of potash fertiliser in the UK

