



**FARM
ADVISORY
SERVICE**



The European Agricultural Fund
for Rural Development
Europe investing in rural areas



Scottish Government
Riaghaltas na h-Alba
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Major Nutrients

- Donald Dunbar
- SAC Consulting

Nitrogen



- Yield driver
- Key in chlorophyll production and protein (amino acid) synthesis.
- Deficiency symptoms – pale older leaves and stunted growth.

Supplied to plant as;

- Nitrate (NO_3) most readily form taken up by plant.
- Ammonium NH_4
but toxic to plant so NH_4 converted by soil microbes to nitrate NO_3 (nitrification).
- Urea (NH_2) convert to NH_4 then NO_3 (soil enzymes) some lost to environment as NH_3 (volatilisation).

Loss greater on high pH soils >6.5 and also dry warm conditions.

Phosphorus



- Key for root development (early growth) and ripening process
- Deficiency symptoms – dull blue green purple leaf, delayed ripening.
- Finite non renewable resource, calcium phosphate 30% P_2O_5 (ground rock phosphate).
- Soluble forms -treat with acid to increase concentration and availability.
- Triple super phosphate 46% P_2O_5 (95% water soluble).
- Phosphate sorption capacity – dependant on soil type
- Timing important if deficient - seedling establishment, early spring growth, dry soil condition in spring sown crops.
- Potatoes and vegetable crops respond to soil phosphate even when status moderate.
- Losses occur when washed out in soil sediment. Causes nutrient enrichment in water course and algal growths.

Potassium



- Key for water regulation in cell sap, osmotic potential plant turgidity and enzymes for photosynthesis
- Deficiency symptoms – lighter older leaves + scorched tip similar to frost damage, older leaves can become totally white. Crops more prone to lodge, small & shrivelled grain
- Potash natural resource mined as Murate of Potash 60% K_2O or manufactured as Potassium Sulphate 50% K_2O + sulphur
- Water soluble, large amounts taken up by vegetative growth so immature harvested crops remove higher levels from soil reserves e.g. silage
- As crop matures much is returned to soil. Higher return in wet season or delayed harvest.



Sulphur - Secondary Nutrient



- Deficiency symptoms – pale younger leaves, also stunted crop in cereals. Oilseed rape middle and upper leaves show interveinal yellowing, and pale flowers. Deficiency more likely on sandy, shallow or soils low in organic matter.

Confirm by tissue analysis, N:S ratio when >16:1

Soil analysis helps to identify high risk soils with low or very low status

- Supplied as elemental sulphur (slow release) or in readily available sulphate form in fertilisers e.g. ammonium sulphate.

Winter Cereals 50kg/ha,

Spring cereals 10-20kg/ha

Rape 75kg/ha,

Grass 40kg/ha per season or per cut

- Apply in spring as very little taken up by leaf (2%), main uptake by roots from soil
- Muck and slurry is useful source of sulphur

Lime



- Not a nutrient taken up by the plant
- Regulates soil acidity measured as pH
- Scottish soils naturally acidic and require lime to maintain soil at optimum pH for nutrient availability and uptake
- Liming materials effectiveness determined by Neutralising Value (NV) Calcium Limestone 50%, Magnesian Limestone 50 – 55%
- Particle size important to speed of neutralising action

Thank You

