A clear solution for farmers

CATCHMENT SENSITIVE FARMING

Catchment Sensitive Farming (CSF) in partnership with the Maize Growers Association (MGA)

Case Study 6: The effect of starter fertiliser on crop yield and maturity when soil phosphate supply meets crop needs

The Maize Growers Association (MGA) with support from the Catchment Sensitive Farm (CSF) project established demonstration sites focused on the impact of starter fertiliser on maize yields and maturity.

Observations were made during group farm visits to the demonstration sites. This case study aims to explain the issues associated with use of starter fertiliser with reference to CSF/MGA demo sites established in the recent past.

Why?

Phosphate is essential for cell development at sites of new cell growth such as root tips and is therefore very important in early plant development. Furthermore it is widely recognised that the young maize roots are particularly bad at attaining this necessary phosphate from the soil.

Maize crops need to accumulate heat units from as early in the season as possible if harvest of a mature crop is to take place early in the autumn when soils are more likely to be dry and better able to take the weight of harvest machinery without soil compaction. To ensure this supply of phosphate to the young maize plant, starter fertiliser, usually containing phosphate and some nitrogen, is routinely applied alongside the maize seed via precision placement drills. Starter fertiliser is often applied regardless of the soil index within the field and the nutrient content of the soil is not always taken into account when producing Nutrient Management Plans (NMP) for the crop. As a consequence the total phosphate applied to a field is often in excess of total crop need.

What is the problem?

In certain, usually low soil index fields, the use of starter fertiliser has been shown to boost crop yield and advance crop maturity as a result of more rapid early establishment however in many fields starter fertiliser has little or no impact and the only consequence of applying starter fertiliser is to build soil phosphate reserves. If this high phosphate soil leaves the field via surface runoff, phosphate can enter watercourse and cause environmental problems.

Fig 1 Drilling maize plots with starter fertiliser at the Exe Valley CSF demo site nr Exeter

What was done?

Demonstration sites, comparing plots receiving no starter fertiliser with traditional Mono-Ammonium Phosphate (MAP) Diammonium Phosphate (DAP) and other nutrient combinations were established in the Tamar, Axe, Wye, Fal and Otter catchments. This case study features the starter fertiliser demo site in the river Fal catchment near Tregony in Cornwall, which was established alongside cultivation, variety, herbicide and organic manure plots during 2010.

Two fertiliser treatments were compared with the control plots which received no starter fertiliser. The products tested and the harvest results from the plots are shown in figure 2 below.

Fig 2: Yield data from starter fertiliser demo plots at Tregony, Fal river catchment Cornwall

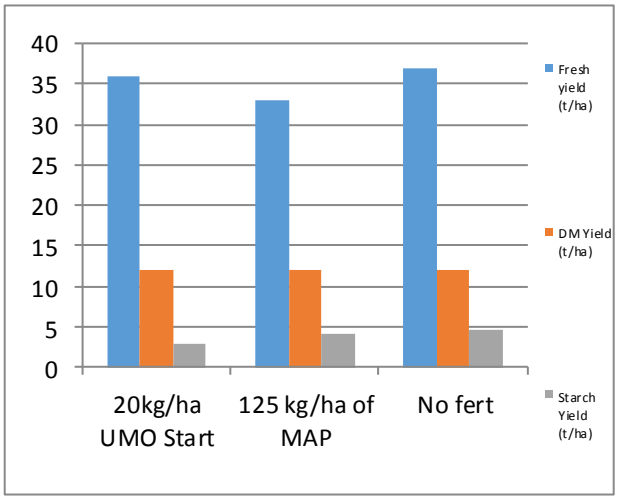

Fig 2 illustrates that in this demonstration no significant differences in crop maturity (Dry Matter DM%) or yield were observed between the various treatments. This 'no benefit' result could well be due to the field having sufficient soil phosphate, pre use of starter fertiliser or that the crop received all that it needed from other sources, be that organic manures such as Farm Yard Manure, slurry or bagged fertiliser.

The starter fertiliser may well have speeded up early crop development leading to a slightly earlier harvest however this early rapid growth, if in fact there was any, did not carry through to final DM% or yield.

The surplus phosphate, applied via starter fertiliser will boost soil reserves and increase the risk of phosphate loss to the river if soil/flooding were to occur.

What next?

MGA advice is that Phosphate and Nitrogen applied as starter fertiliser should be fully accounted for in the full field Nutrient Management Plan (NMP) and not applied to fields with a Phosphate index of 3 or above. In fields with soil indexes of 2 or above yield increases linked to the use of starter fertiliser are relatively rare. Crops grown in fields receiving starter fertiliser, across a broad range of soil phosphate (P) indexes, look to be more advanced early in the crops development compared to plants receiving none. This advanced early development tends to speed up maturity and as a consequence bring harvest forward by typically by 1-2 weeks. It is important to recognise that applying more phosphate than the crop needs will result in soil phosphate reserves (soil P index) increasing alongside the increasing risk of phosphate loss from the field to the wider environment.

If growers remain determined to use starter fertiliser on fields with high levels of soil phosphate the MGA would encourage them to use low application rates or products which apply low volumes of phosphate.

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