Basingstoke Monitor Farm meeting report

Meeting 7: Reducing costs without compromising yield
Speakers: Dr Syad Shah (Plant scientist), Keith Truett (NIAB and ex-farm manager), Nick Rowsell (Farmer)
Date: 31 October 2018
Venue: Whitchurch Longmeadow Sports Club, Whitchurch, RG28 7RB

For more information, visit: cereals.ahdb.org.uk/Basingstoke

Meeting summary – key messages

- Understand what your main nutrients do and how they can affect growing crops
- Understand the factors that affect efficient nutrient efficiency uptake (NUE)
- Know your soils and their physical properties through regular soil sampling and digging soil pits
- pH and mineral imbalances can affect the NUE as will variety used & drilling date
- Utilise available information to help make decisions (Recommended Lists, Nutrient Management Guide (RB209)) but be realistic on yield expectation by annualising data from past 5+ years
- Implement integrated approaches to weed and pest management and never rely on one aspect alone
- Ammonium nitrate fertiliser is proven to leach more readily through soils than urea
- Timing of applications is crucial
- Be aware of nutrient interactions that can antagonise and/or stimulate plant growth.
- Soil applied bacteria can improve soil N use efficiency
- Always monitor the impact of your strategies

Using nutrients to improve productivity

- Macronutrients
  - Nitrogen: critical to plant growth and, with the production of large leafy plants, an oilseed rape crop has a high requirement. Optimising canopy size to increase light interception is an essential role of nitrogen, helping maximise crop yield.
  - Phosphorus: essential for the production of ATP within the plant and, therefore plays a major role in providing the energy behind many plant metabolic processes, enzyme activity and root development. This energy is also needed for the active uptake of other plant nutrients.
  - Potassium: plays a major role in the uptake, and subsequent redistribution, of water and nutrients into the plant whilst also influencing protein and starch production. It also affects turgor pressure in the plant helping to strengthen it, reducing lodging and making it less susceptible to disease

- Calcium: essential for cell wall formation. Calcium increases the mechanical strength of the plant improving its disease resistance. Adequate supply of calcium promotes proper plant cell elongation stimulating development of roots and shoots.
- Magnesium: the central atom in chlorophyll molecules, magnesium is essential for the formation of plant chloroplasts and therefore, photosynthesis. Other roles include involvement in protein production, mobilisation of plant carbohydrates and acting as one of the building blocks of ATP.
- Sulphur: essential for the formation of plant proteins, amino acids, vitamins and enzymes. Part of the enzyme required for nitrogen uptake, adequate sulphur is required to optimize nitrogen use efficiency.

- Micronutrients
  - Manganese: has a very important role in the development of disease resistance in plants. Its application has been reported to have positive effects in controlling many foliar diseases, such as powdery mildew, downy mildew, tan spot and take-all. This is because Mn controls the biosynthesis of lignin and suberin through the activation of several enzymes.
  - Copper: has a very important role in disease resistance and reproductive growth. Copper deficiency may play a role in increased infection, because Cu is necessary for cell wall lignification. When lignification is disrupted, cell walls are more susceptible to penetration by fungi.
  - Zinc: is a structural component of several enzymes and is required for enzyme activation. Its application may reduce disease severity, which could be due to the direct effects of Zn on the pathogen but not through the plant's metabolism.
  - Boron: plays important roles in cell wall synthesis and structure, and possibly membrane stability. It has a significant role in disease resistance, which is attributed to its role in cell wall structure, cell membrane permeability, stability and its role in the production of phenolics and lignin. It has been observed that B deficiency causes abnormal development of reproductive organs which reduces crop yield.

- Nitrogen use efficiency (NUE) is the ability of the crop to capture nutrients form the available supply and the efficiency with which it is utilised to produce grain yield
- Factors affecting NUE:
  - Soil type (Physical and non-chemical factors)
  - Soil related factors (Soil pH, soil water and organic matter)
  - Nutrients and soil interaction
  - Regional rainfall (leaching, runoff)
  - Timing of application of the nutrients (2 splits, 3 splits, 4 splits)
  - Products (solid vs liquid)
- Soil applied bacteria can improve N use efficiency
- Liquid fertilisers can be applied accurately and are more crop available in dry conditions

Fit for the future – Nick Rowsell

Objectives:

- Increase soil resilience
- Improve soil structure
- Increase nutrient use efficiency
- Sustain high yields
- Reduce pesticide use

Actions:

- Increase soil OM% (see Measuring and managing soil organic matter)
- Increase cation exchange capacity (CEC) which influences the soils ability to hold nutrients. Organic matter has a high CEC
- Reduced cultivations – no till
- Diverse plant mix cover
- More soil sampling
- More precise fertiliser use

Find out more – Links to AHDB information sheets or research

Nutrient Management Guide (RB209)
AHDB Recommended Lists for cereals and oilseeds
Measuring and managing soil organic matter
Testing soil health
Soil assessment methods

Next meeting

Date: 27 November 2018
Topic: Sustainable farming – what is it and can it benefit my business?
Time: 10:00
Location: Whitchurch Sports and Social Club, Whitchurch RG28 7RB

For more information or to find out more about Farmbench, AHDB's benchmarking tool, contact: Paul Hill

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