

Seedbed Utilisation (SBU) – Calculating safe urea N fertiliser rates

Rohan Rainbow, Senior Research Scientist SARDI
Operation FerTill™ is a SARDI, Pivot, Flexi-Coil and GRDC research partnership.

KEY POINTS

- Higher N rates can be used with increased SBU%
- The impact of dry soil on safe SBU rates is unclear at this stage and further research is required to develop safe models. At this stage if soil conditions are dry at seeding, reduce SBU fertiliser rates by up to 50%.

SEED SPREAD CAN CHANGE SAFE FERTILISER RATES

Seeding equipment used in Australia has changed considerably over the last few years. Most seeding equipment up until recent years have mainly sown on a 6-7" (160-180 mm) row spacing with 4-6" wide shares (100-150 mm) or more recently with narrow soil openers or points giving a seed spread of 1-2" (25-50 mm).

Seeding equipment used in conservation farming has tended toward;

- Wider row spacings to improve trash flow and handling of crop stubble residues.
- Narrower seed spread to reduce soil disturbance.

Increased fertiliser concentration in the seed row is a principal problem that has developed as a result of the shift towards conservation farming. There has been an introduction of many new seeding concepts including wider tine row spacings, soil openers that spread the seed as wide as 12" (300 mm) and fertiliser banding systems in the last few years. This now makes it very difficult to give a blanket recommendation for a maximum rate of fertiliser in the seed row (such as 25 kg/ha nitrogen N as urea) for all types of seeding machines.

Many farmers have found that using wider seed spread patterns has enabled more N to be placed in the seed row. Farmers however are concerned that wider seed row spacing and narrow seed spread patterns with narrow points may actually require less N to be placed in the seed row.

This has led to common problems with fertiliser toxicity in the seed row by three main processes;

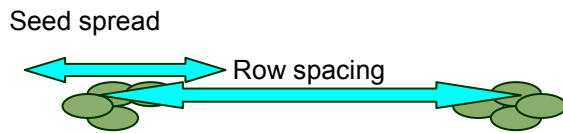
- Toxic chemical effect from ammonia vapour, most likely to occur with urea, mono and di-ammonium phosphates.
- Osmotic or salt effect due to a high concentration of salts produced from a soluble fertiliser dissolving in water. This high salt concentration leads to a transfer of solute or water through the cell membrane of the emerging seedling roots into the salty soil solution, effectively dehydrating the root plant cells, resulting in seedling death.
- Seed desiccation from direct moisture absorption by fertiliser. This would only be a problem in very dry soil conditions.

SBU %

Seedbed utilisation (SBU) is a risk analysis tool that can be used to determine the potential for emergence damage and crop yield reduction. The lower the SBU %, the higher risk of seed damage and crop loss. This tool first developed in Canada, is extensively used for calculating safe fertiliser concentration in cereal and canola crops.

The SBU formula equates the spread pattern of seed and nitrogen (N) and/or phosphorus (P) relative to row space. It is the amount of seedbed over which the N has been spread expressed as a percentage:

$$\text{SBU} = (\text{spread mm} \div \text{row spacing mm}) \times 100$$



The SBU is a useful tool to be included when changing soil openers or seeding points, and when purchasing equipment and changing seed row widths. These SBU values can be used to calculate approximate maximum tolerance levels to N and P fertiliser based on their relative toxicity effect. Although some soil openers and seeding points will also spread the seed and fertiliser vertically, SBU does not take this into account, since it is

recommended that all seed be placed at an even depth for even germination and crop emergence.

Cereal crops are relatively tolerant to salts from soluble fertiliser in comparison to some pulse crops and in particular canola. Toxic chemical effect from ammonia vapour will occur with urea and ammonium phosphates such as MAP and DAP if tolerated rates are exceeded. Dry soil conditions will reduce seedling tolerance to these fertiliser rates.

Further Information

Rohan Rainbow, SARDI, Clare District Office Tel 88423900

Figure 1. SBU % and Urea N rate effect on wheat establishment in moist soil, Miniaton 2000.

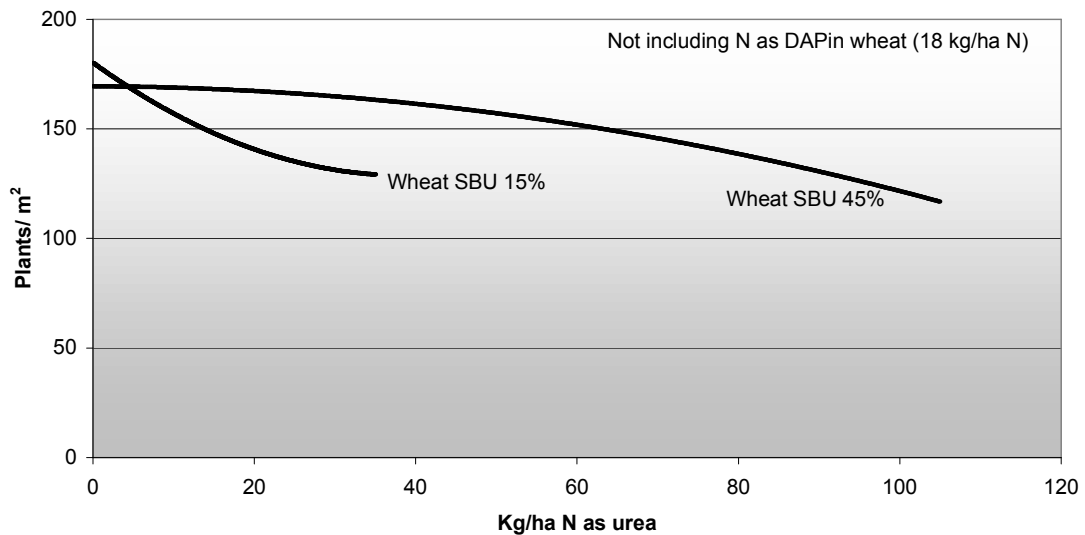


Figure 2. SBU % and Urea N rate effect on wheat yield, Miniaton 2000.

