

SWEP FACT SHEET #13

Guidelines for Managing Plant Nutrients in the Soil

A frequent comment about nutrient recommendations from SWEP (we do not recommend specific fertiliser products) is that there doesn't seem to be enough to allow for things like nutrient lock-up or other 'modifying factors'.

Comments like this are quite true, but the reason is that our recommendations are based on what is required once the work to minimise (or eliminate) the effects of these modifying factors has been done. So, for best results, it is important to apply our recommendations according to the principles of the Mikhail System. This treats soil as a 'Living System' in which all aspects need to be managed together as an integrated process.

Unfortunately, many farmers have been led to believe that soil tests are only about fertiliser and so they do not send in samples until they are ready to call their contractor and put in an order. Using our nutrient recommendations at this time (either alone or in combination with the Lime and Gypsum), will not give the best result.



An important requirement of the Mikhail System is that Lime, Dolomite and Gypsum need at least six months (more if rainfall is low) to produce their effects on the soil, so that optimum fertiliser efficacy can be assured.

These notes explain the basis for SWEP nutrient recommendations, how nutrients can be more effectively managed during the season and what you can do to get as good a result as possible if you need to start with a 'fertiliser first' approach.

Soil has needs of its own

Even with no production – just to maintain essential plant cover and microbial activity – soil has a need for nutrients. How much of each nutrient is needed will depend on the CEC (or the capacity of the soil to provide nutrients in plant-available form).

The first step in preparing nutrient recommendations must, therefore, be to look at the levels of available nutrients on a soil test report and make a provision for any that are below this essential 'base fertility' level.

This principle applies to all living systems – not just soil. For instance, each of us requires a certain calorie intake just to stay alive – before we even begin to work out what is needed to support our particular activity level. If we do not make any allowance for this, we will find ourselves unable to meet the goals or objectives we would like in sport, work or family life. We see the same thing in our crops when, even in good seasons, they fail to meet our expectations.

Plant requirements for a single season

Every plant has its own requirement for various nutrients and every soil has its own capacity for providing these nutrients – the two cannot be separated! What is more, the needs of a crop will vary throughout its life. For much the same reason that you do not expect a newborn baby to eat a three-course steak dinner (much less the its complete food requirement for a lifetime), newly emergent seedlings and shoots should not be expected to properly utilise an entire season's nutrient requirement all at once.

Of course, the soil is an important factor here. Light, sandy soils have only a small capacity to hold nutrients in plant-available form, so smaller repeated applications would be essential. On the other hand, a strongly structured, well-prepared clay soil can have a large capacity to hold and supply plant nutrients over an extended period.

For these reasons, heavier soils (given adequate preparation) will be suited to crops for which changes in requirement over the season are small and/or repeated applications are impractical – due to limited

equipment access, etc.). Conversely, sandy soils are best for irrigated crops with special nutrient needs at certain critical stages.

A soil test can give you the overall nutrients required for a given crop on a particular soil, but you may still need some help working out how and when to best apply those nutrients. The advice of an agronomist with experience on the crop in question and how it performs in your region will be essential to getting close to the optimal '*crop potential*' for the season.

Responses limited by soil balance relationships

So why is it many growers find simply applying more fertiliser fails to deliver improved results?

The short answer is that while they may be achieving optimal crop potential, they are nevertheless operating at less than their maximum '*soil potential*'. In fact, it has been estimated that even many of the best farmers today are only working on 30% to 40% of their true soil potential.

However, the first step should be the application of any required Lime, Dolomite or Gypsum (for soil structure and function). The application of fertiliser should be the second step, done six months later. You can get more information about this from our Fact Sheet on the 5 steps to soil health. To summarise however, the important steps to improve any soil are:

- 1. Soil test to identify the problem**
- 2. Adjust the Cation Balance first (usually in Autumn)**
- 3. Apply fertiliser six months later**
- 4. Stimulate soil biology after every disturbance**
- 5. Monitor and Adjust**

An important aspect of this method is that it leads to progressively reduced inputs, until only small maintenance applications of fertiliser are required each season for both sustainable and cost-effective production. This contrasts with the vicious cycle of applying more fertiliser to increase productivity, but then needing even more productivity to cover the increased cost – requiring still further increases in fertiliser application rates – and so on.

If you must use a 'Fertiliser First' approach

It must be stressed that this approach is NOT recommended and that proceeding in this way can make adequate results difficult to obtain. However, where there is no option but to use fertiliser first, the following points will assist in making the most of the situation.

Since you will be applying controlled amounts of whatever nutrients are actually needed – rather than just more and more of the same old NPK – you can expect to get a satisfactory result from SWEP nutrient recommendation (all other factors aside). However, getting the *most* from your soil potential will mean waiting until you can apply any required Lime, Dolomite &/or Gypsum and giving these adequate time to take effect with improved cation balance, soil structure and friability.

During the current season, while you are waiting to do this, but still needing to maintain production, there are a few things you can do to get the best possible response from your fertiliser:

- 1.** You could try supplementing the nutrient recommendations on your soil test report with a little extra Phosphorus.
- 2.** If the soil pH (measured in water) is less than 5.7, apply the trace elements (and extra P if you can) as a foliar spray, but consult your local Agronomist or SWEP agent about the best timing for this.
- 3.** If your soil pH (in water) is above 8.0 foliar applications of trace elements will be essential.
- 4.** If your recommendations include a high Nitrogen requirement, consider splitting this into two or three applications at critical crop stages. Again, your Agronomist or SWEP agent can help you with this, but please let us know if we can be of any assistance as well.
- 5.** Don't overlook the Sulphur. Using low analysis phosphate and the sulphate forms of other fertilisers will usually be enough to meet any requirement you have for this nutrient.

Further Reading:

SWEP Fact Sheet #6: "*How do I turn Nutrients into Fertiliser?*"

SWEP Fact Sheet #12: "*Only 5 steps lead to soil health*"