

# *Agent Update*

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### **Desirable Levels**

One problem we find many Agents encounter is in understanding our desirable levels and how they affect our recommendations. We hope these brief notes will help clarify things, but if you have any questions, please don't hesitate to call and discuss them.

There are actually two categories of desirable levels: The first is for cation balance, which is the same for all soils, but dependent upon the CEC (see Fact Sheet #4 for more details). The other covers plant requirements for balanced nutrition and is also adjusted according to the CEC.

The most common mistake is to try and equate our desirable levels to the amounts of nutrients removed by a crop.

Remember, SWEP deals with soil and our desirable levels reflect the soil test result that would make it easiest for the crop or pasture to obtain what it needs throughout its growing season.

To properly understand this it may help to compare nutrient uptake to the way plants get the moisture they need. When the soil is at or near field capacity, plants will usually have no difficulty getting all the water they need. As the moisture level in the soil declines, however, plants need to expend energy in order to meet their requirements and as they take up water, the amount of energy they must use to get more will progressively increase until, finally, they cannot get any more. We call this the 'Wilting Point' for obvious reasons. It is not that there is no more water in the soil, just that plants cannot get it out.

Likewise with nutrients; there will be a 'Luxury' level at which plants will have no trouble getting all they need. This is what most fertiliser companies target, as it simplifies things and lets them treat the soil like a sponge – fill it up, squeeze it dry and fill it up again.

However, both plants and soil often do better at levels below this – levels at which plants can easily get what they need, even if they must expend a little energy to do so. This is where SWEP desirable levels are positioned, but of course it is a system that will work best if everything else in the soil is working well – so limiting the amount of energy plants need to use in meeting their requirements.

This is similar to the situation where people who eat a balanced diet and exercise moderately can maintain a high level of health. Plants will do best with balanced nutrition, but at a level where they must do some work to obtain it.

Combining this balanced nutrition with proper cation balance results in both optimum yields and sustainable high-quality production.

When formulating our recommendations we take into account the existing level of each nutrient in the soil, the sample depth and the desirable level for the given Land Use. The end result is the quantity of nutrient (NOT fertiliser) required to adjust the level in the soil as closely as possible to the desirable level for the period of the growing season for that crop or Land Use.

Re-testing the soil the following year should see the soil level for nutrients either remaining the same or being slightly higher or lower. Any changes that may occur can be used to adjust the application somewhat – but don't forget to take seasonal conditions into account. For example, dry conditions that limit yield may result in an accumulation of some nutrients, while wet conditions or unusually high yields may result in nutrient levels falling a bit. This is why it is important to soil test every year – to make sure you can maintain properly balanced nutrition in every season.

Other things to bear in mind are yield targets and special soil conditions.

SWEP has a database of desirable levels for over 200 crop species and these are based on fairly general yield targets. While we are continually expanding this database, including a desirable level for every region (remember we get samples from across Australia and around the World) would be an almost impossible task. So there may still be a need to adjust our recommendations for your specific needs.

For example, we have three sets of desirable levels for Wheat: “Dry Low”, “Dry” and “Irrigated”. “Dry Low” assumes less than 500mm of annual rainfall and a yield target of 2.5 t/ha, “Dry” is for regions with more than 500mm annual rainfall and yields of 5 t/ha and “Irrigated” provides for yields of 7.5 to 10 t/ha. Knowing this, you can choose the appropriate Land Use and then scale up or down as necessary.

For specific information on particular Land Uses, please contact Ted, but try not to get to ‘Picky’ about things. For instance, if you were trying to grow wheat in a region 500mm of rain and targeting say 3.5 t/ha, you would probably find little or no benefit (to the grower) in scaling the “Dry Low” recommendations up. This is because available levels of available nutrients often improve with improvements to soil cation balance. Again, you should re-test annually before you try to refine things any further.

A few other things in the soil can affect the desirable levels at times. One is soil pH. If this is less than 5.7 the Trace Element recommendations should be omitted until after the cation balance corrections have been applied and had time to become effective.

Another is soil hydrology. In situations where a shallow water table is suspected, Gypsum applications should be avoided until an effective sub-surface drainage system can be installed.

Lastly, one particular Land Use that causes concern is “Pasture”. Many people are used to working out fertiliser applications for pasture on the basis of DSE/ha and find this single set of desirable levels confusing, however, the same principals apply.

That is, the stocking rate-based recommendation system is based on achieving “Luxury” levels in the soil during the peak *grazing* period, while SWEP recommendations are for pasture nutrition through the normal *growing* season. Thus, the desirable levels for “Pasture” are based on high rainfall (800mm +) or irrigated pasture grazed at about 36 DSE/ha.

Again, this can be scaled up or down as required, but for general purposes, multiply by 1.5 for more intensive grazing and reduce by a half to three-quarters for lower rainfall or native pasture.