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The Basic Cation Saturation Ratio Concept

As guideline upon which soil analyses are interpreted and fertilisation is applied, the basic cation saturation ratio (BCSR) concept (now better known as the Albrecht system) has become popular amongst various plant nutritionists. It is based on a presupposition that plants will only grow optimally if there is a balanced ratio of cations (Ca^{2+} , Mg^{2+} and K^+) for each soil according to its cation exchange capacity (CEC). Fertilisation is therefore done according to the soil's needs, not the plants'.

This development is unfortunate. Apart from the fact that it has no proper scientific foundation with regard to plant nutrition, a line is being drawn through all the proper scientific work done on plant nutrition through the years. In a review article, Kopittke & Menzies (2007) trace the BCSR concept back to the late 1800's and found that since its origin **no** research data has been able to prove the existence of any "ideal" basic cation saturation ratio. Instead, they found that promotion of the BCSR concept resulted (and will result) in **inefficient** use of resources and fertilisers.

Instead, research by various local and overseas scientists has shown that the Sufficiency Level of Available Nutrients (SLAN) concept, where a minimum concentration of available nutrients in the soil is required for optimal plant nutrition also applies to vines. Producers are again reminded that although the "ideal" soil varies dramatically from region to region and soil type to soil type, it generally looks as depicted in the table below. It is based on a minimum level of nutrients that is required in the soil to supply the vine of its nutritional requirements. This is an excerpt from an article by Van Schoor, Conradie & Raath (2001):

Analyses	Other criteria	Critical value	Problem	Aspects that affect fertilisation application
pH _{KCl}		< 5.5	Lime requirement	% stone & organic material
Resistance (?)		< 100 ?	Unsuitable	Drainage
EC (mS/cm)		100-300 ?	Salinity	Maximum applications % stone
		>3.5	A possible gypsum requirement	The soil's exchangeable sodium percentage (ESP)
Phosphorus (P) (Bray II extract)	0-6% clay 6-15% clay >15% clay	< 20 mg/kg <25 mg/kg <30 mg/kg	P-requirement	Extraction method Over fertilisation
Potassium (K)	Sandy Loamy Clayey	< 80 mg/kg <100 mg/kg <120 mg/kg	K-requirement	Texture Salinity Over fertilisation
Nitrogen (N)		Poor growth	N-deficiency	Irrigation
		Too vigorous	N-toxicity	Growth
Zink (Zn)		< 0.5 mg/kg	Zn-deficiency	Foliar analyses Soil pH Foliar applications
Manganese (Mn)		< 5 mg/kg	Mn-deficiency	
Boron (B)		< 0.3 mg/kg	B-deficiency	
	>3.8 mg/kg	B-toxicity		

References

- Kopittke, P.M. & Menzies, N.W., 2007. A review of the use of the basic cation ratio and the "ideal" soil. Soil Sci. Soc. Am. J., 71, 259-265.
Van Schoor, L., Conradie, W.J. & Raath, P.J., 2000. Guidelines for the interpretation of soil analysis reports for vineyards. Wynboer, 135, 101-103,