PROCEEDINGS OF SUBSOIL ACIDITY WORKSHOP HELD AT FERTASA ON 29-05-2017

PROGRAMME:

Welcome and introduction: Pieter Haumann welcomed all present and introduced Drs Chris Gazey and Steve Carr.

Steve Carr is managing director of a Company called Precision Soil Tech and Chris is a Senior Research Officer with the Government of Western Australia, Department of Agriculture and Food.

Steve and Chris proceeded to present their research findings and practises regarding the Wheatbelt NRM soil acidity project “Optimising soil pH for sustainable farm practises” (project No 04A1-07).

The following aspects were highlighted for attention in the affected areas in South Africa namely managing the acidity of sandy soils of the Central Grain Production region of South Africa.

1. Targeted liming: The primary target should be to obtain a pH(CaCl)of 5,5 to 6.0 $CaCl_2$ 0.01 M in the topsoil. The reason for this is to ensure that surplus acidity in the topsoil does not occur therefore preventing the subsoil from acidifying. The corresponding pH(KCl) would be 5.3 to 5.8.

2. Exchangeable Aluminium is not determined *per se* since pH(CaCl) is an accurate indicator of exchangeable Al on these unbuffered soils. At a subsurface soil pH(CaCl) above 4.5 to 4,8,(pHKCl 4.3 to 4.5 aluminium concentration is usually less than 2 mg/kg, As pH(CaCl) falls below 4.5 aluminium concentrations increase rapidly and quickly becomes toxic to most crop species. This is equivalent to a pH(KCl) level of 4.3

3. The primary target pH(CaCl) for subsoil is therefore to be above 4.5 at least. pH(KCl) 4.3.

4. Careful soil profile inspection should be done in season to determine whether soils are acidified or not. The use of a universal pH indicator is advised to determine this *in situ*. This is demonstrated well in the Guide kindly donated to Fertasa members.

5. Soil sampling should be done at increments of 10 cm up to a depth of 30 cm to determine subsoil acidity build up.

6. When subsoils are acidic the most effective method of amelioration is deep liming. Several implements to enable this were discussed. Research in Western Australia has shown that limited efficiency is achieved regarding mixing of lime with the subsoil. The implements succeed however in allowing plant roots to reach less acid horizons and thereby improve crop yield.

7. It was also emphasised that soil sampling should enable differential liming on the precision farming principle.

8. Limes are evaluated by incubation of different particle size as follows

1. Calculate the overall per cent efficiency of the lime (EP)

Lime EP = Sum all individual particle size EP

EP for the particle size = % of lime × neutralising value (NV) × particle size discount factor

Lime EP for lime X = **86.9** (Table 9)

Table 9 Calculations to determine the lime EP for lime X from Figure 45.

Particle size (mm)	Particle size discount factor	% of lime	NV	% efficiency (EP)
0–0.125	1	5	90	(5 ÷ 100) × 90 × 1 = 4.5
0.125–0.25	1	48	90.5	(48 ÷ 100) × 90.5 × 1 = 43.4
0.25–0.5	1	38	94.8	(38 ÷ 100) × 94.8 × 1 = 36.0
0.5–1	0.5	8	72.1	(8 ÷ 100) × 72.1 × 0.5 = 2.9
> 1	0.2	1	62.5	(1 ÷ 100) × 62.5 × 0.2 = 0.1
				OVERALL EP = SUM OF PARTICLE SIZE EP = 86.9

9. Application of gypsum to ameliorate subsoil acidity is not advisable on the relatively unbuffered soils in Western Australia.

10. Application of ultrafine lime in the fertilizer band has negative consequences on yield under experimental conditions.

11. Application of ultrafine lime made into granules and placed in the fertilizer band has limited effect since the surface of reaction of the fine lime is reduced to almost the same as large particles of lime.