

2016 GRDC Grains Research Update, Perth



Soil acidity – is gypsum part of the solution?

James Easton, CSBP Field Research Manager

McLay et al. Aust. J. Soil Res., 1994

“Gypsum increased wheat yields by up to 45% in the first two growing seasons whereas lime increased wheat yields by up to only 15% in the second season.

The highest yields were generally recorded when gypsum and lime were applied together.

In contrast to wheat, lupin yields were substantially lower on gypsum-treated plots.”

Soil tests - 2008

| Soil depth (cm) | pH | EC | OC | N(Nit) | N(Amm) | P | PBI | K | S |
|-----------------|-----|------|------|--------|--------|----|-----|----|----|
| 0-10 | 4.4 | 0.07 | 0.8 | 28 | 12 | 32 | 31 | 70 | 11 |
| 10-20 | 4.2 | 0.03 | 0.63 | 7 | 1 | 14 | 40 | 61 | 10 |
| 20-30 | 4.2 | 0.03 | 0.31 | 7 | 1 | 6 | 40 | 56 | 14 |

| Soil depth (cm) | Ex Ca | Ex Mg | Ex K | Ex Na | Ex Al | ECEC | Ex Al% | Al | B |
|-----------------|-------|-------|------|-------|-------|------|--------|----|-----|
| 0-10 | 0.72 | 0.19 | 0.15 | 0.06 | 0.16 | 1.4 | 11 | 4 | 0.8 |
| 10-20 | 0.46 | 0.03 | 0.11 | 0.02 | 0.33 | 1.0 | 33 | 10 | 0.6 |
| 20-30 | 0.54 | 0.05 | 0.12 | 0.03 | 0.39 | 1.1 | 35 | 12 | 1.0 |

Treatments



| Trt | 2008 (t/ha) |
|-----|-----------------------|
| 1 | - |
| 2 | 1 lime |
| 3 | 2 lime |
| 4 | 4 lime |
| 5 | 1 gypsum |
| 6 | 2 lime + 1 gypsum |
| 7 | 2 dolomite |
| 8 | 2 dolomite + 1 gypsum |

Treatments

| Trt | 2008 (t/ha) | 2013 (t/ha) |
|-----|-----------------------|-----------------------|
| 1 | - | - |
| 2 | 1 lime | 1 lime |
| 3 | 2 lime | 2 lime |
| 4 | 4 lime | 4 lime |
| 5 | 1 gypsum | 1 gypsum |
| 6 | 2 lime + 1 gypsum | 2 lime + 1 gypsum |
| 7 | 2 dolomite | 2 dolomite |
| 8 | 2 dolomite + 1 gypsum | 2 dolomite + 1 gypsum |

2008

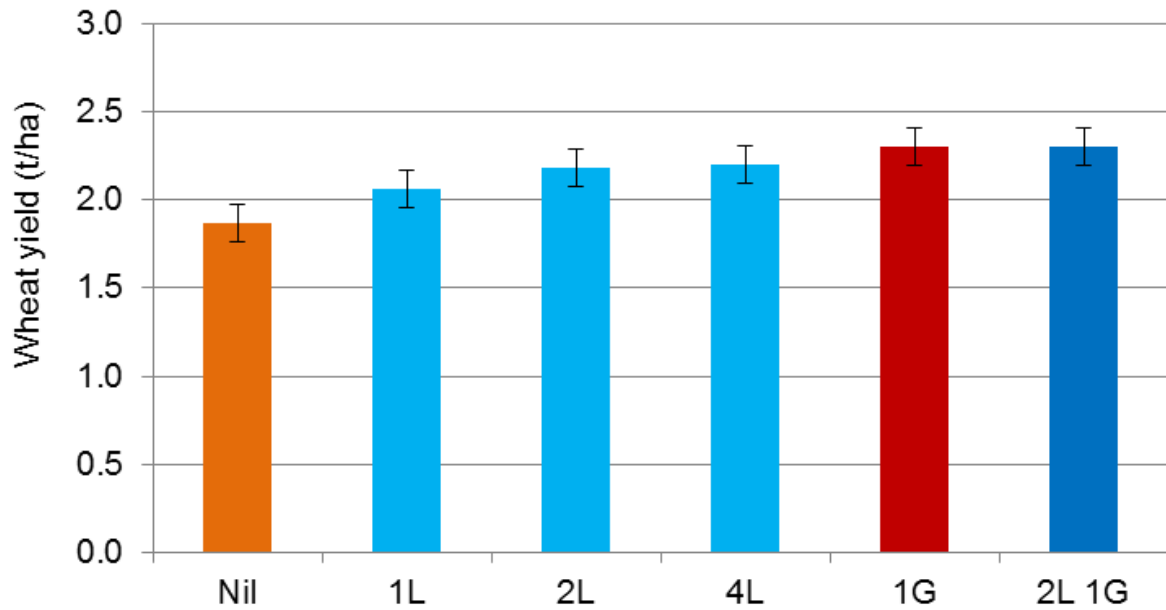


1 t/ha lime

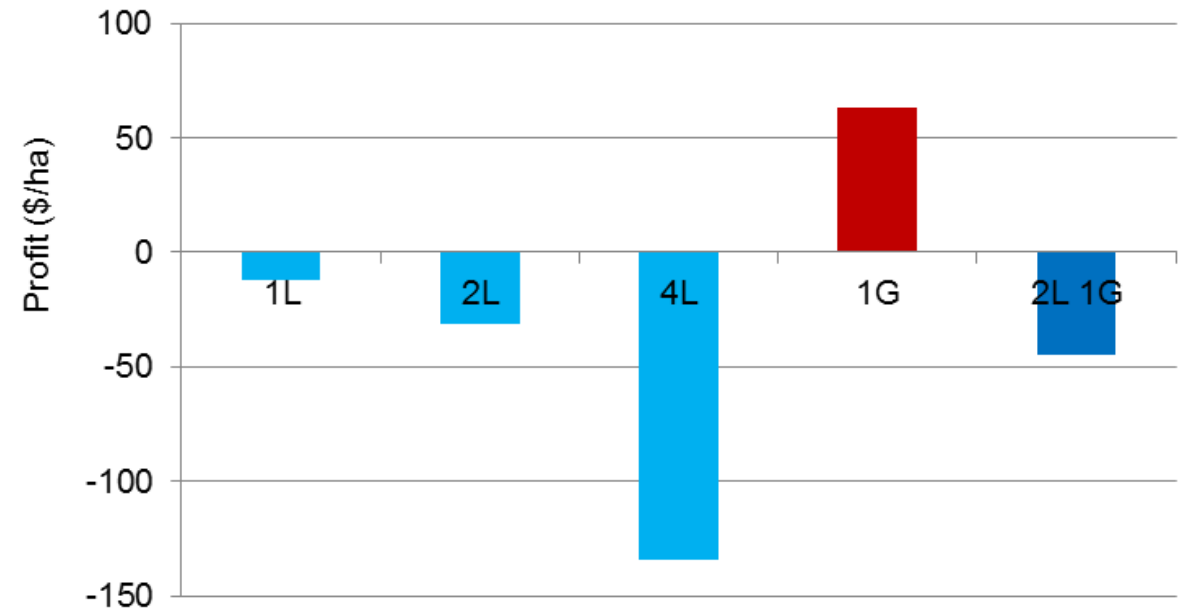
1 t/ha gypsum

2008 yields and profit

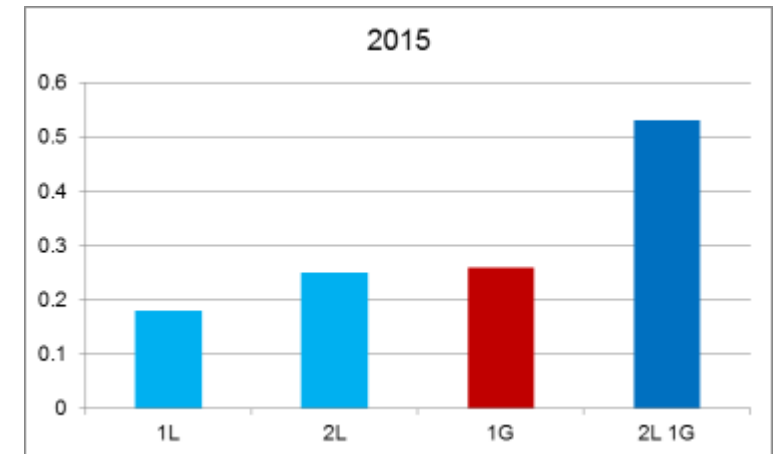
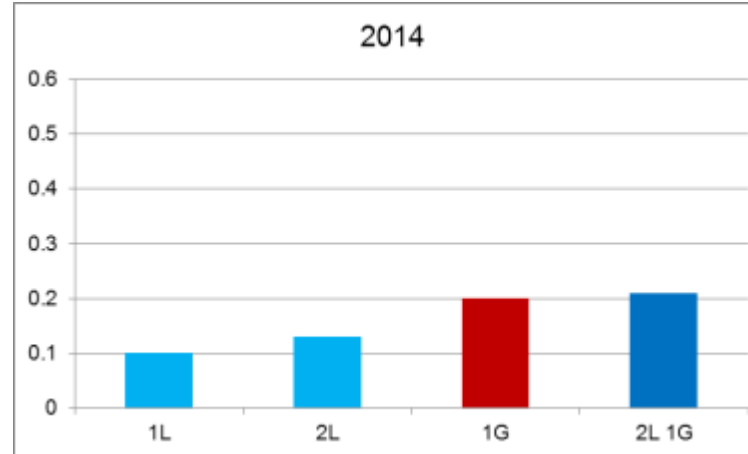
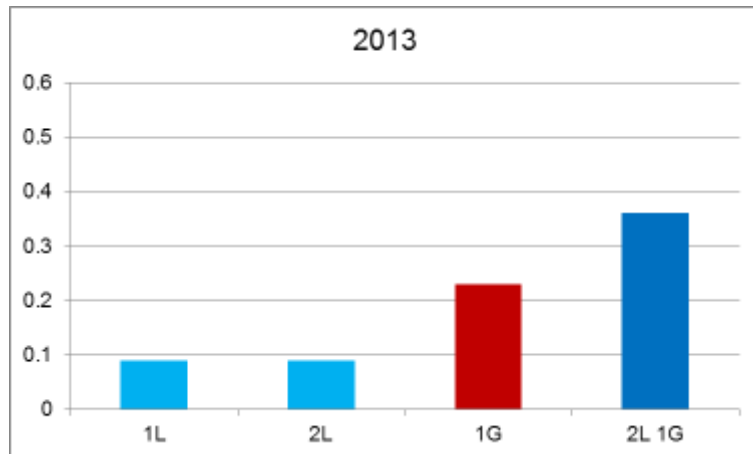
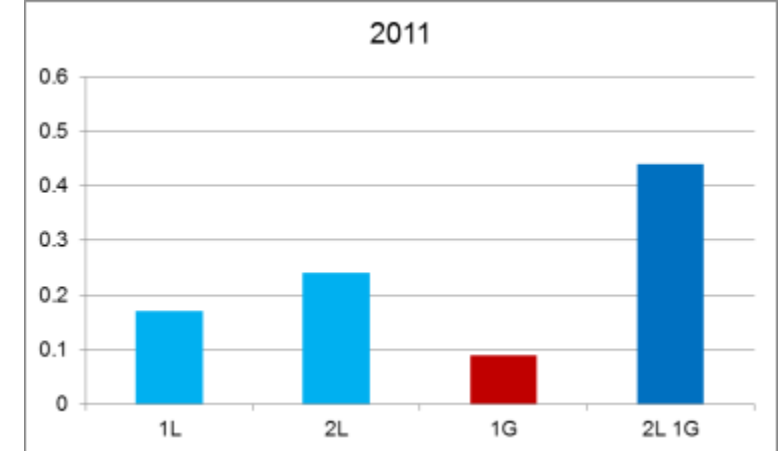
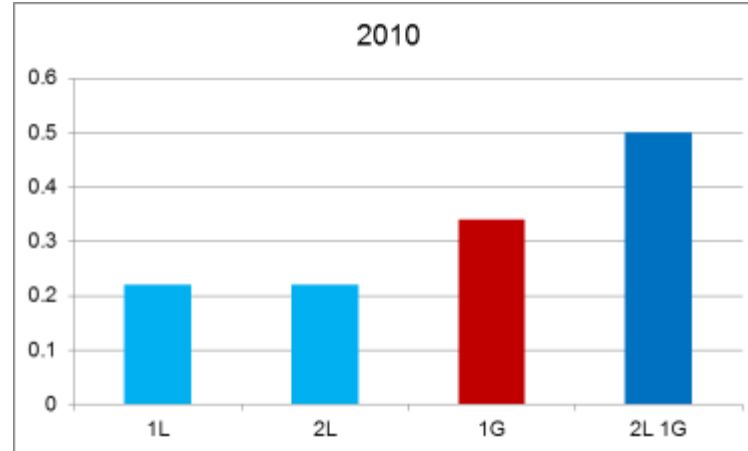
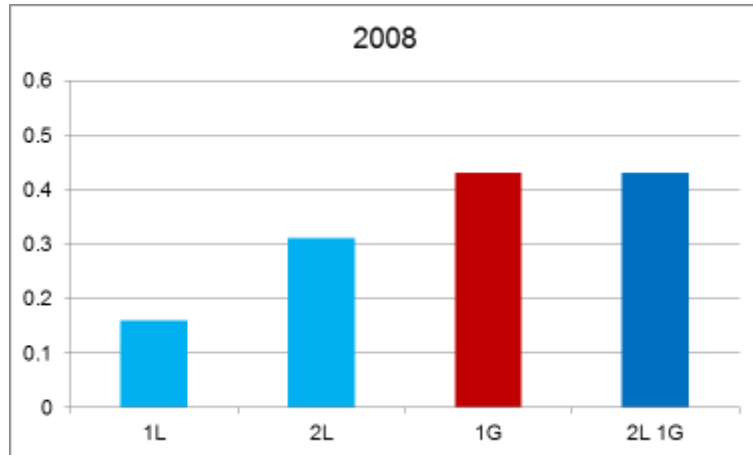
Wheat Yield (t/ha)



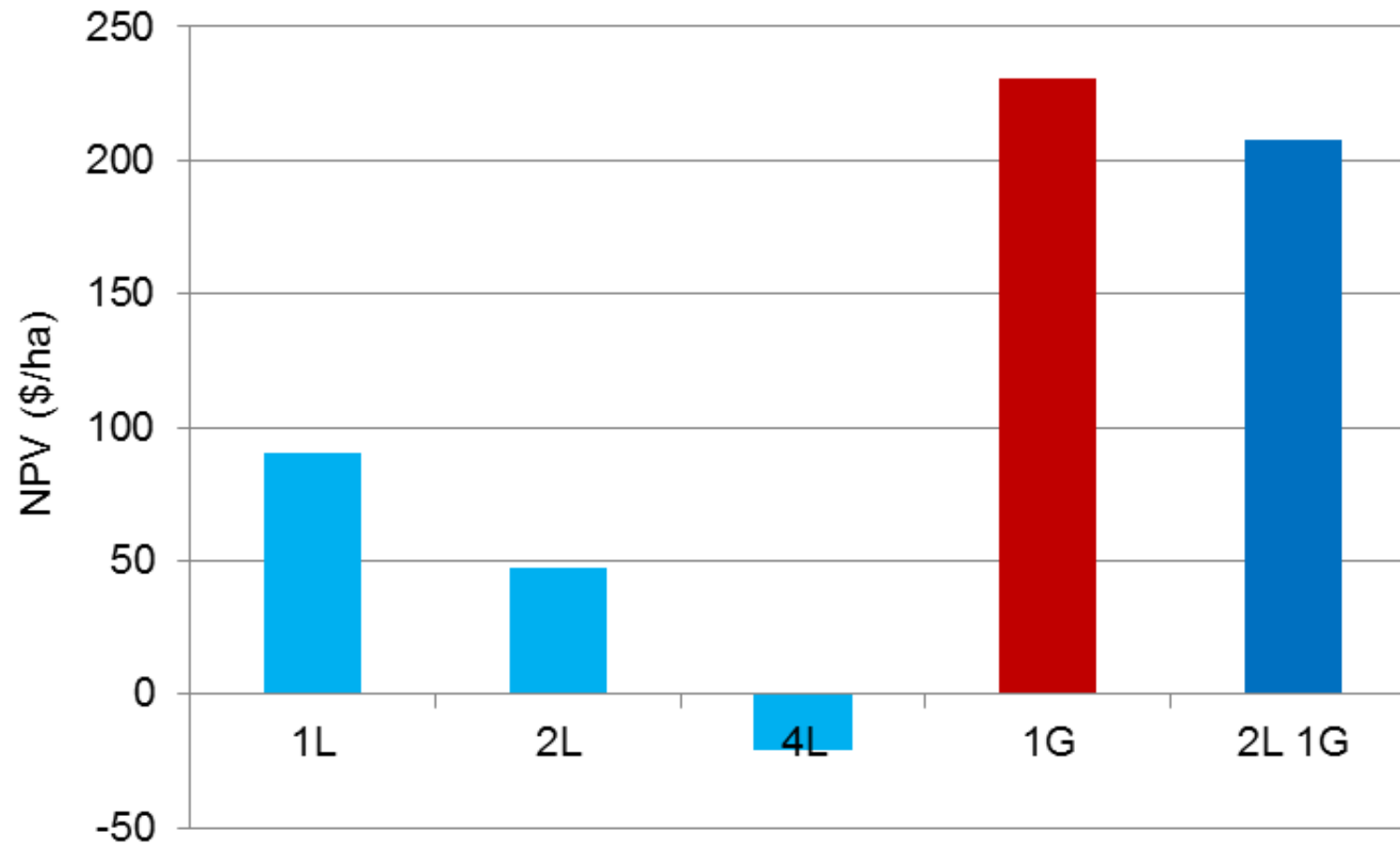
Profit (\$/ha)



Yield responses (t/ha) year by year



Net present value

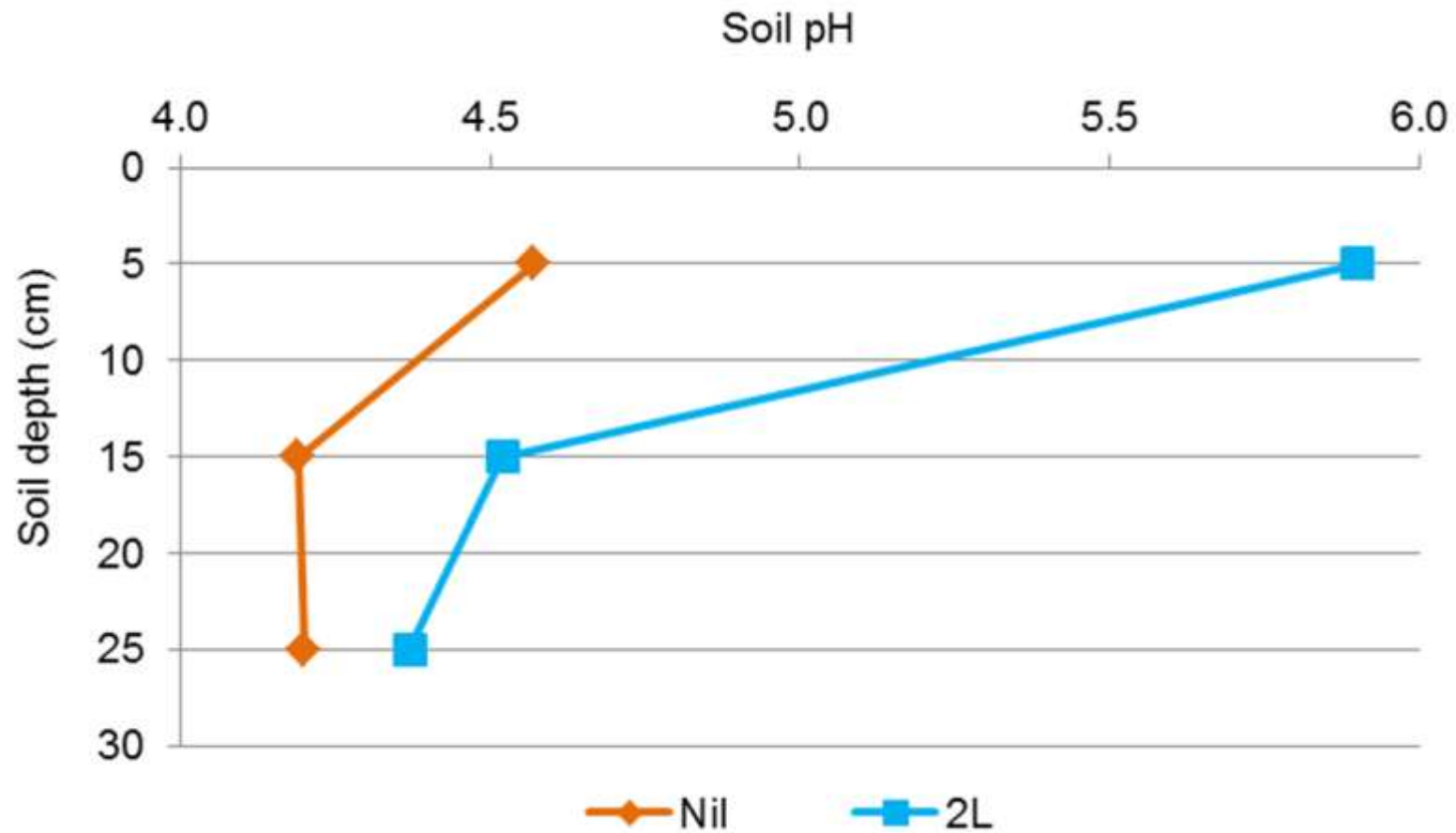




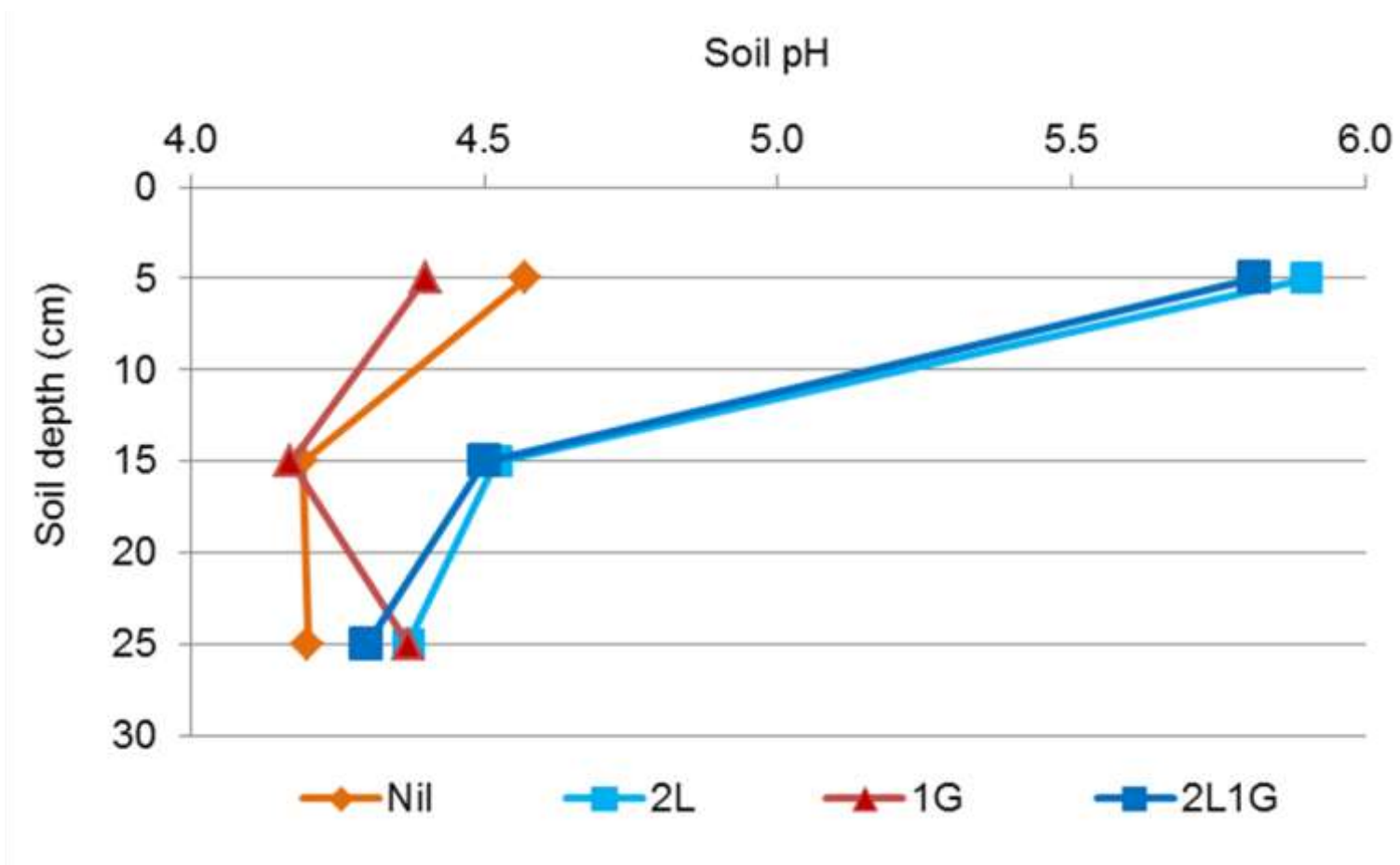
Soil test measurements

December 2015

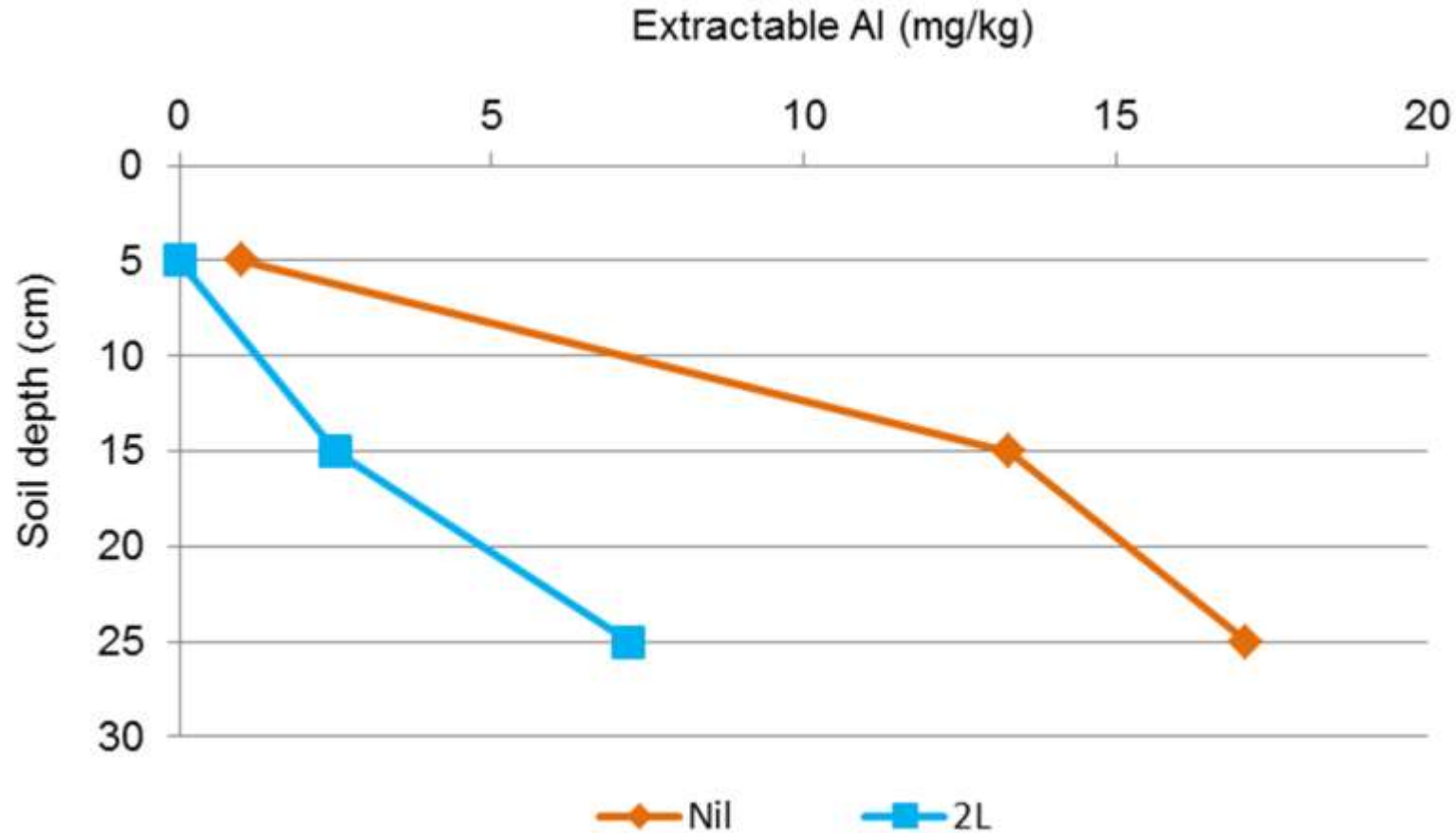
Soil pH (CaCl₂)



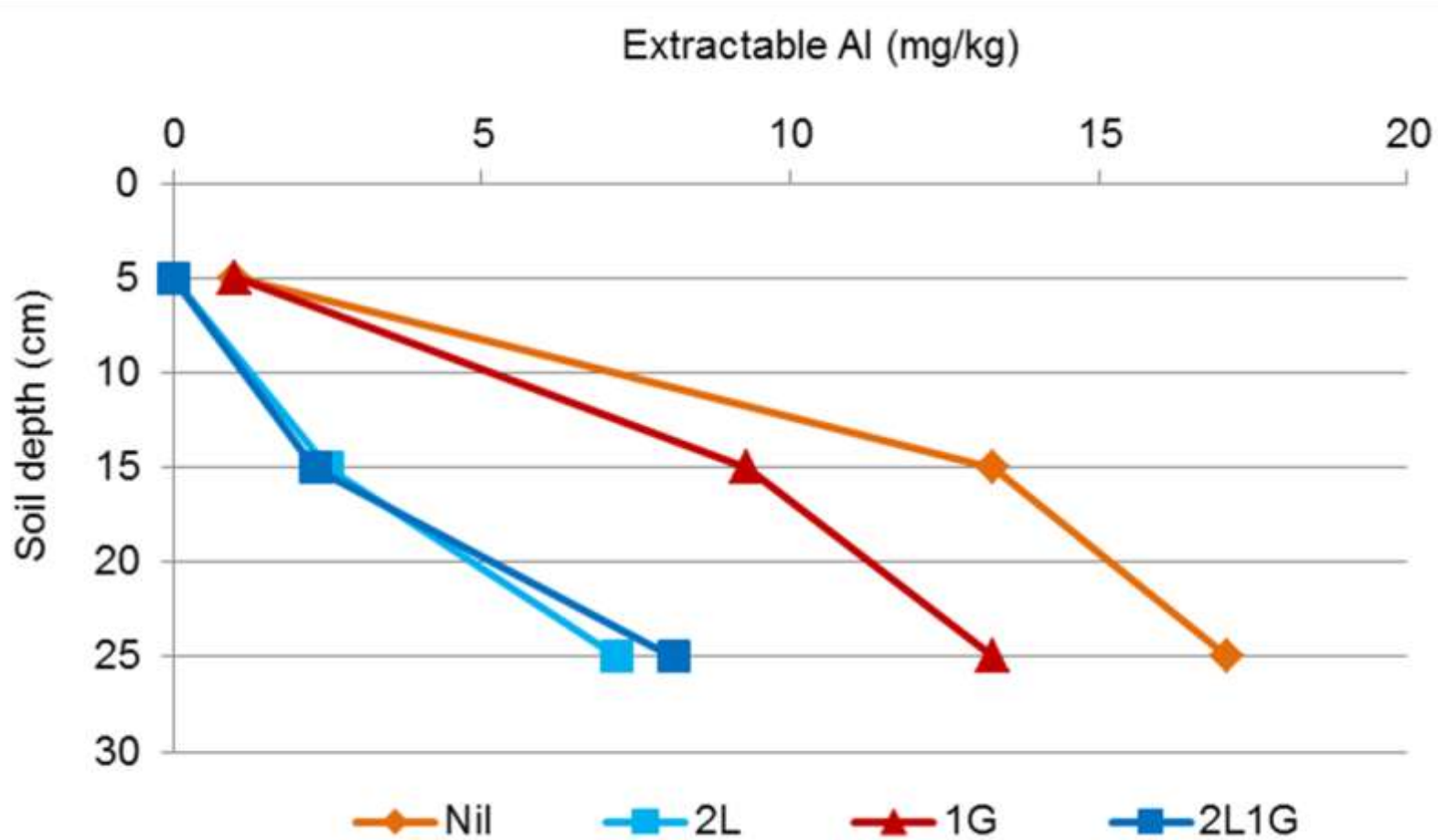
Soil pH (CaCl₂)



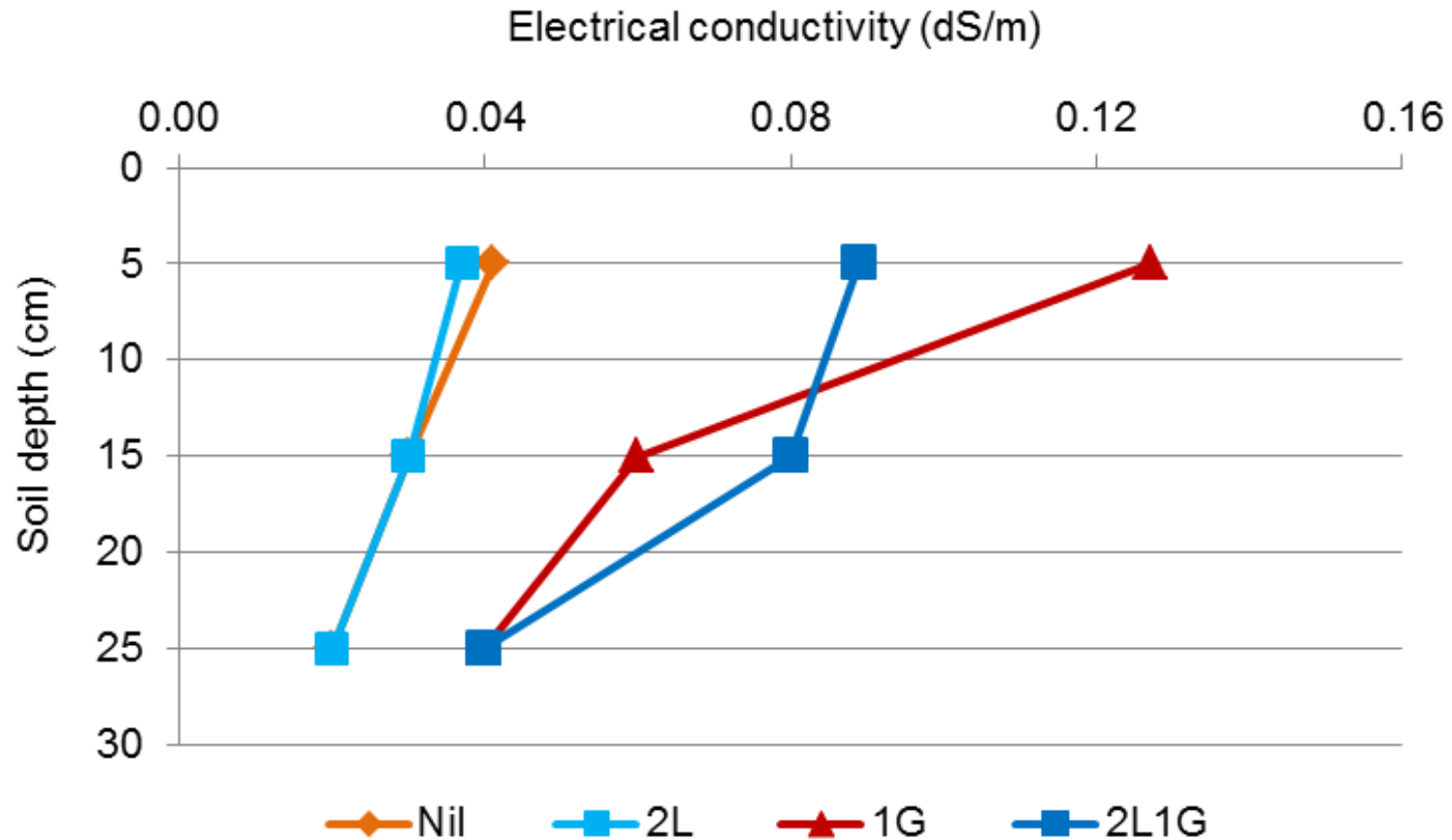
Extractable Al (CaCl₂)



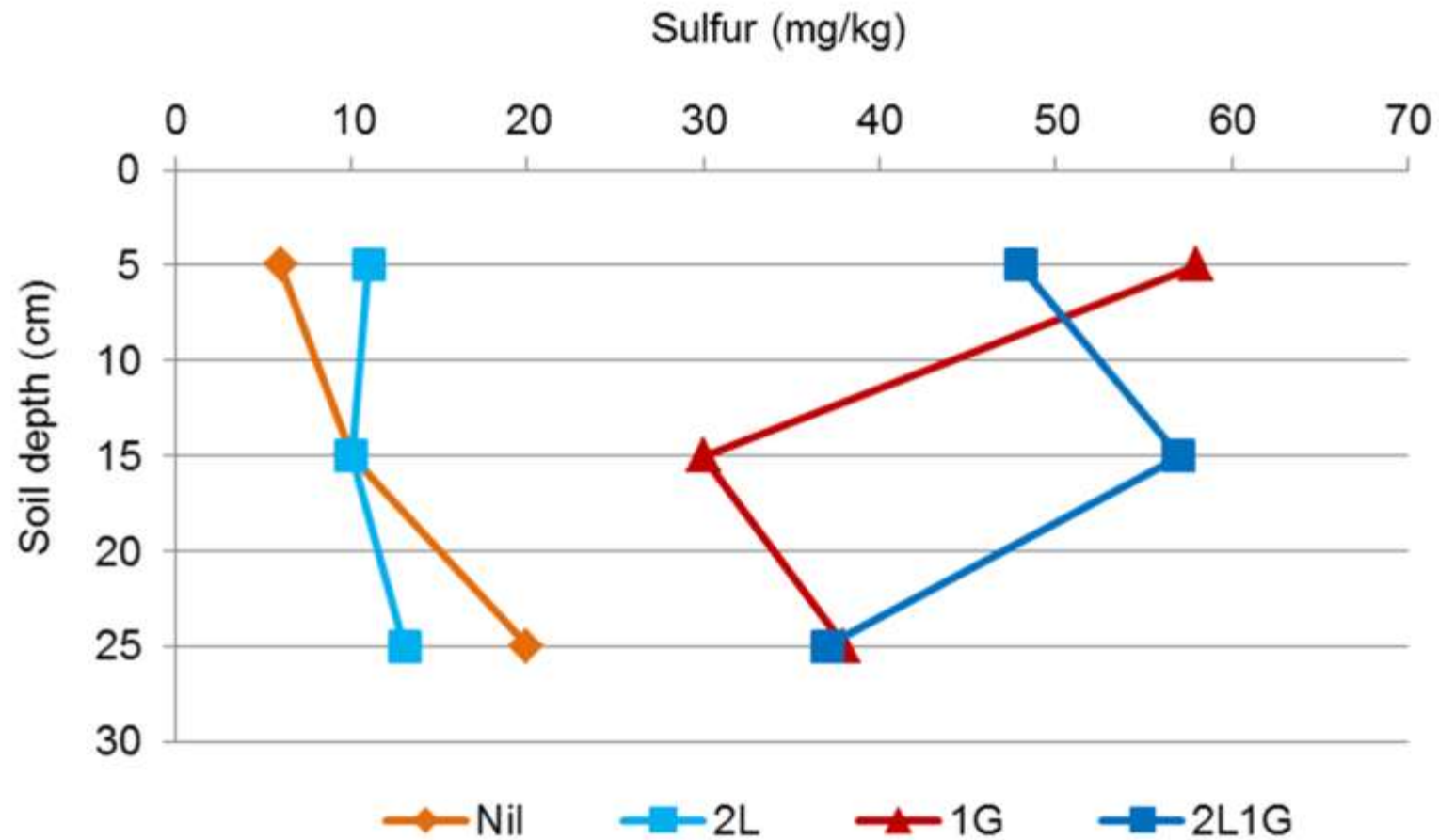
Extractable Al (CaCl_2)



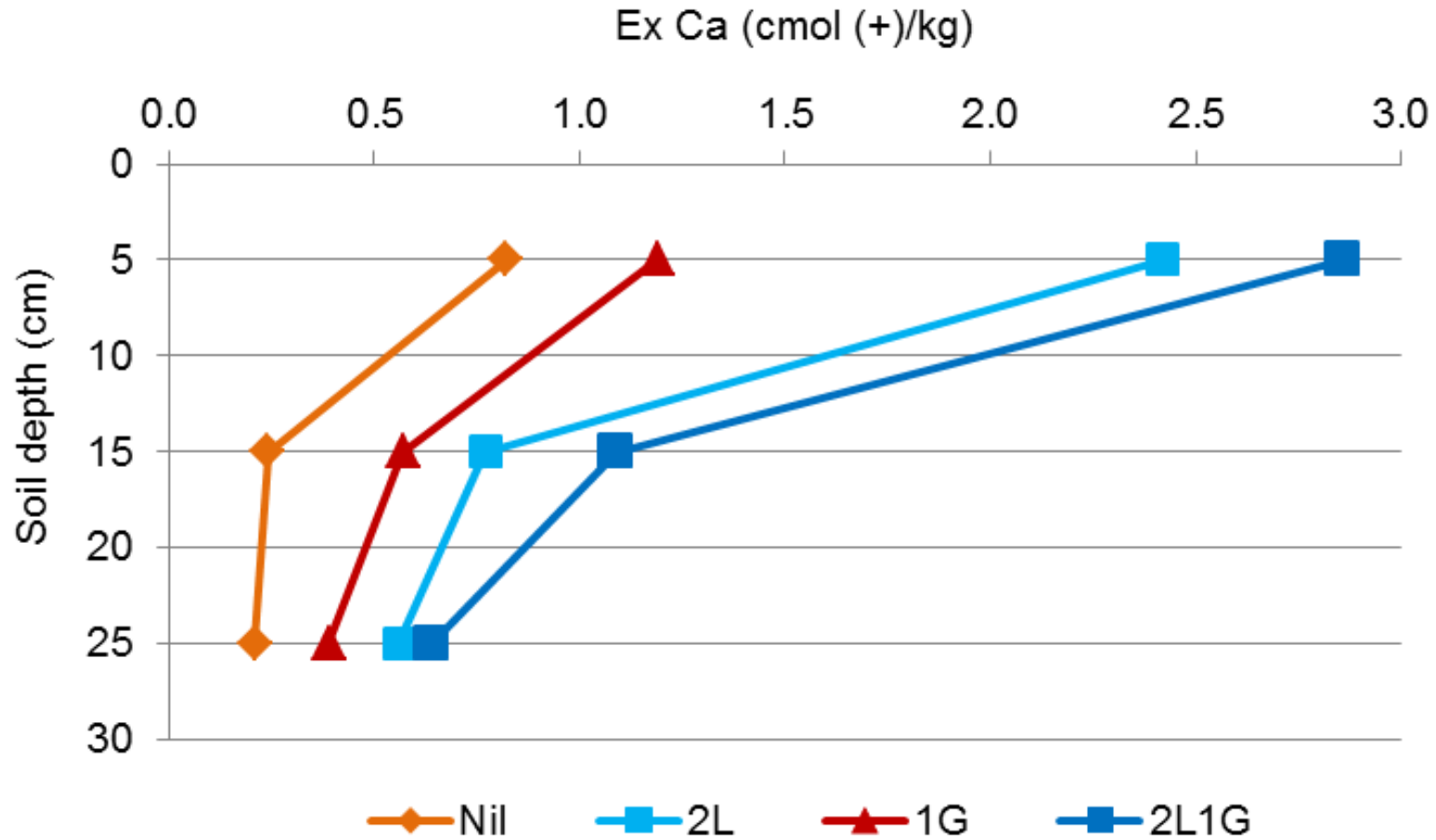
Electrical conductivity



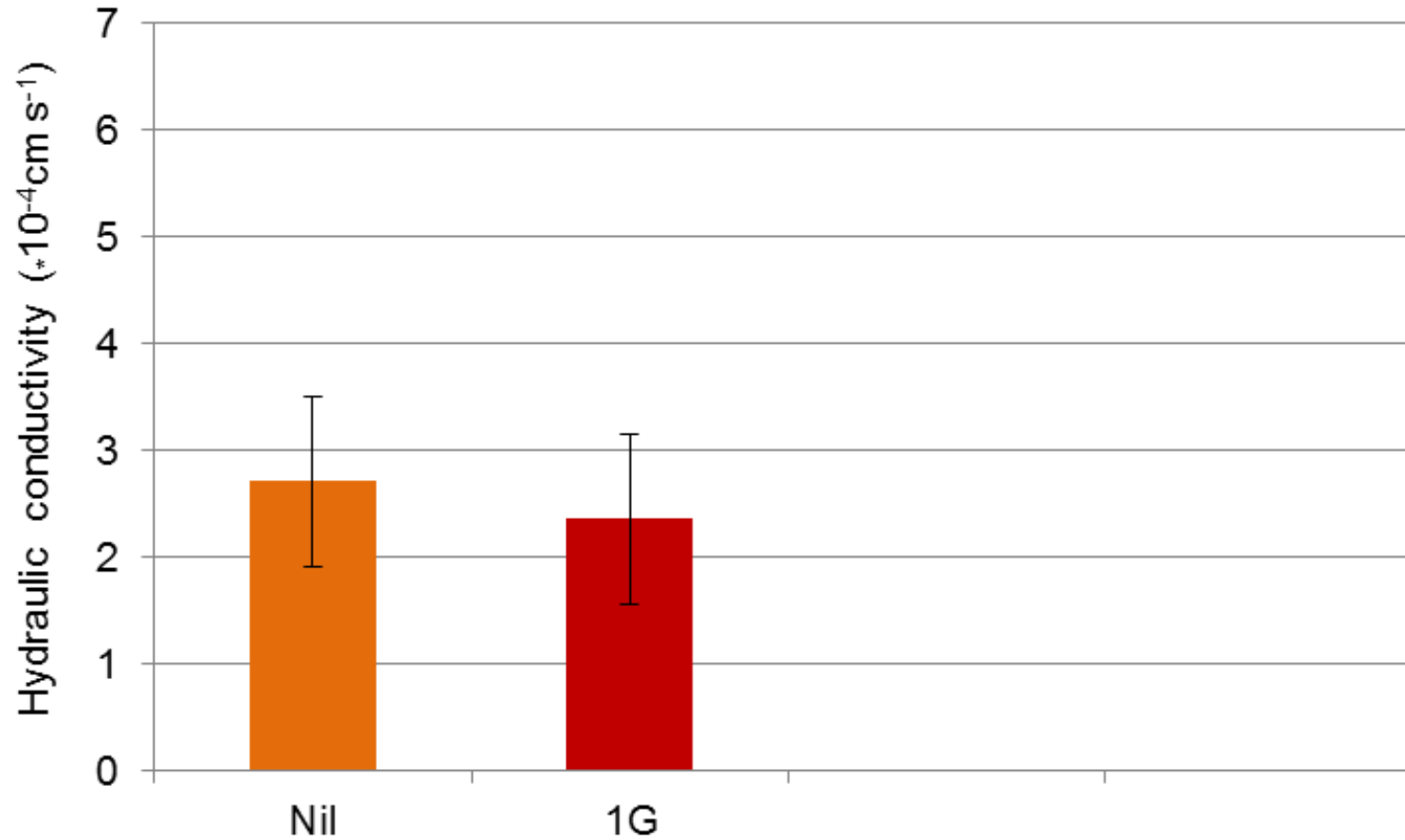
Sulfur



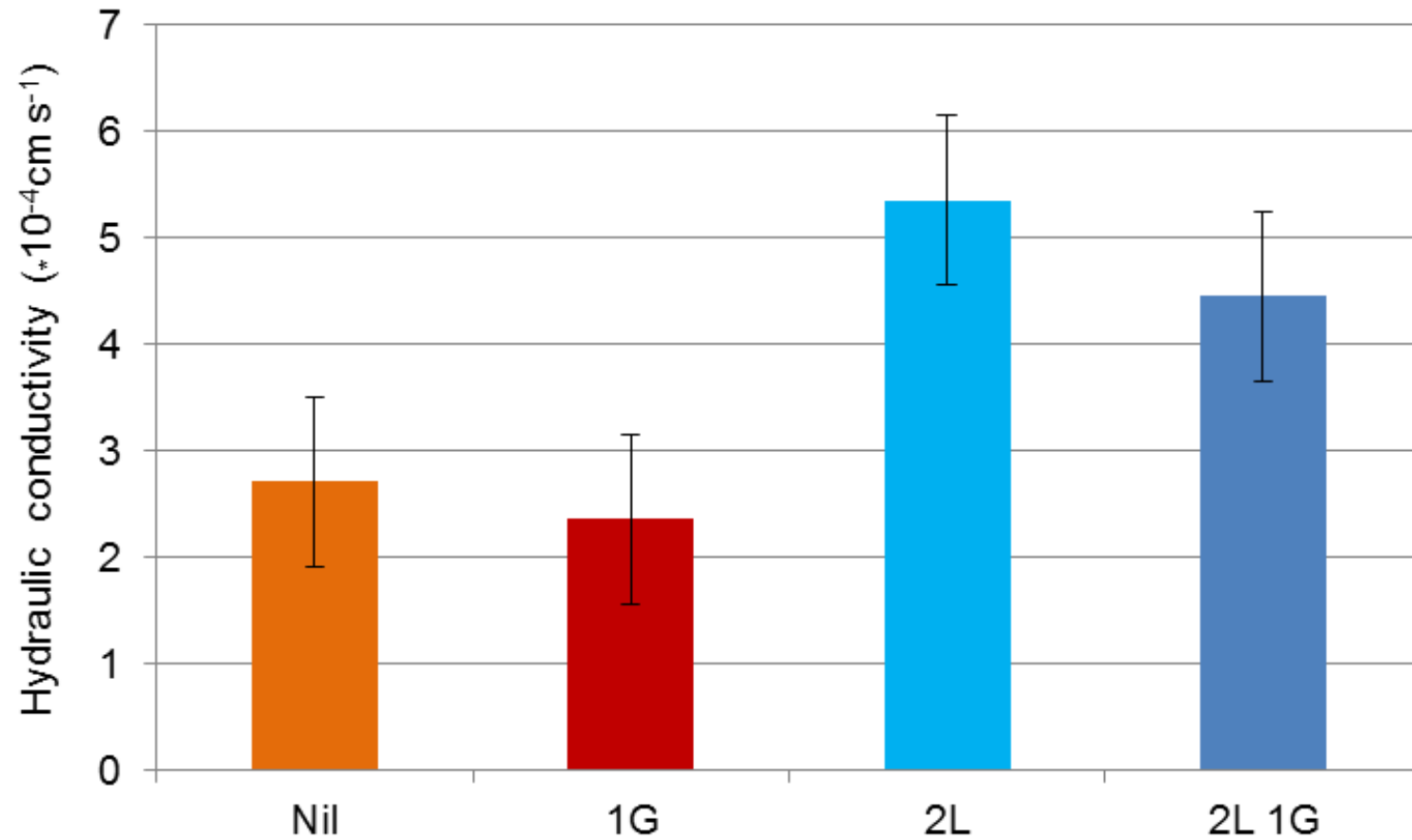
Exchangeable calcium



Hydraulic conductivity



Hydraulic conductivity





Key messages

- Surface applied gypsum can improve wheat yields on soils with sub soil Al toxicity
- Gypsum offers a rapid return on investment that can help fund lime and/or dolomite applications
- Gypsum appears to be part of the solution.

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Questions?



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