

## Cation Exchange Capacity: Its Context as an Integral Component of Soil Characterisation.

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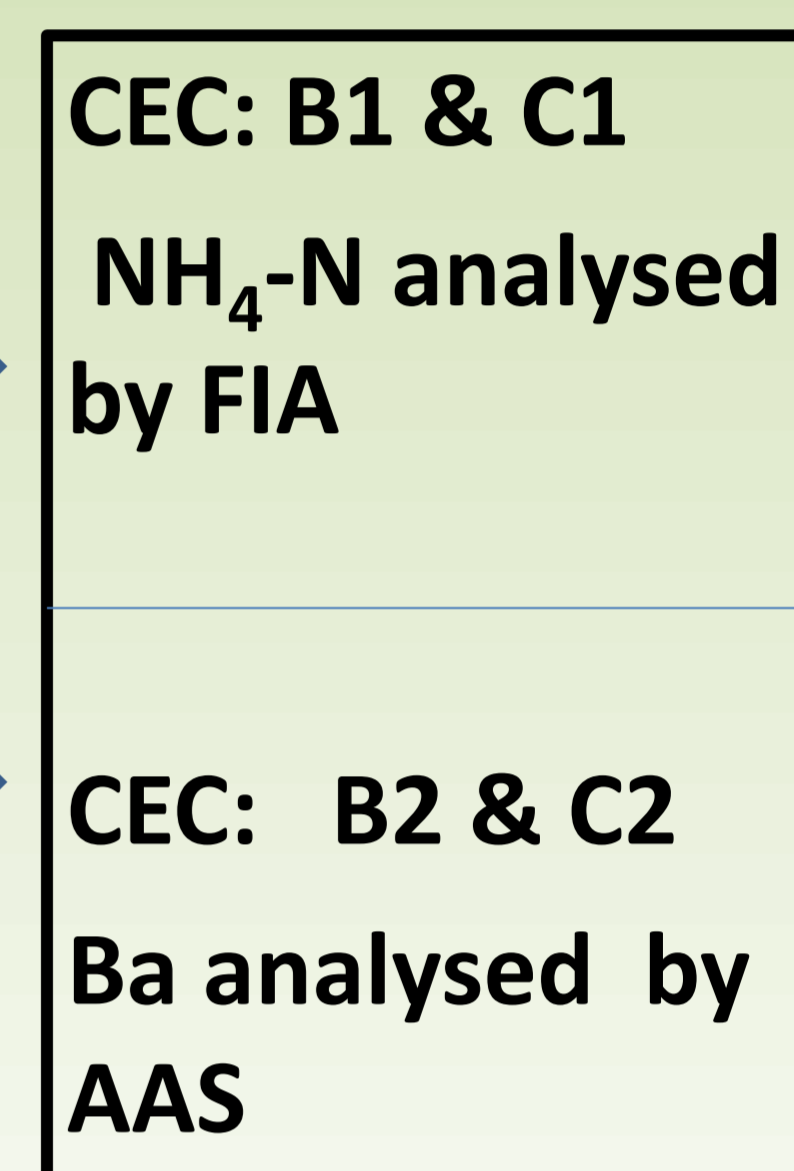
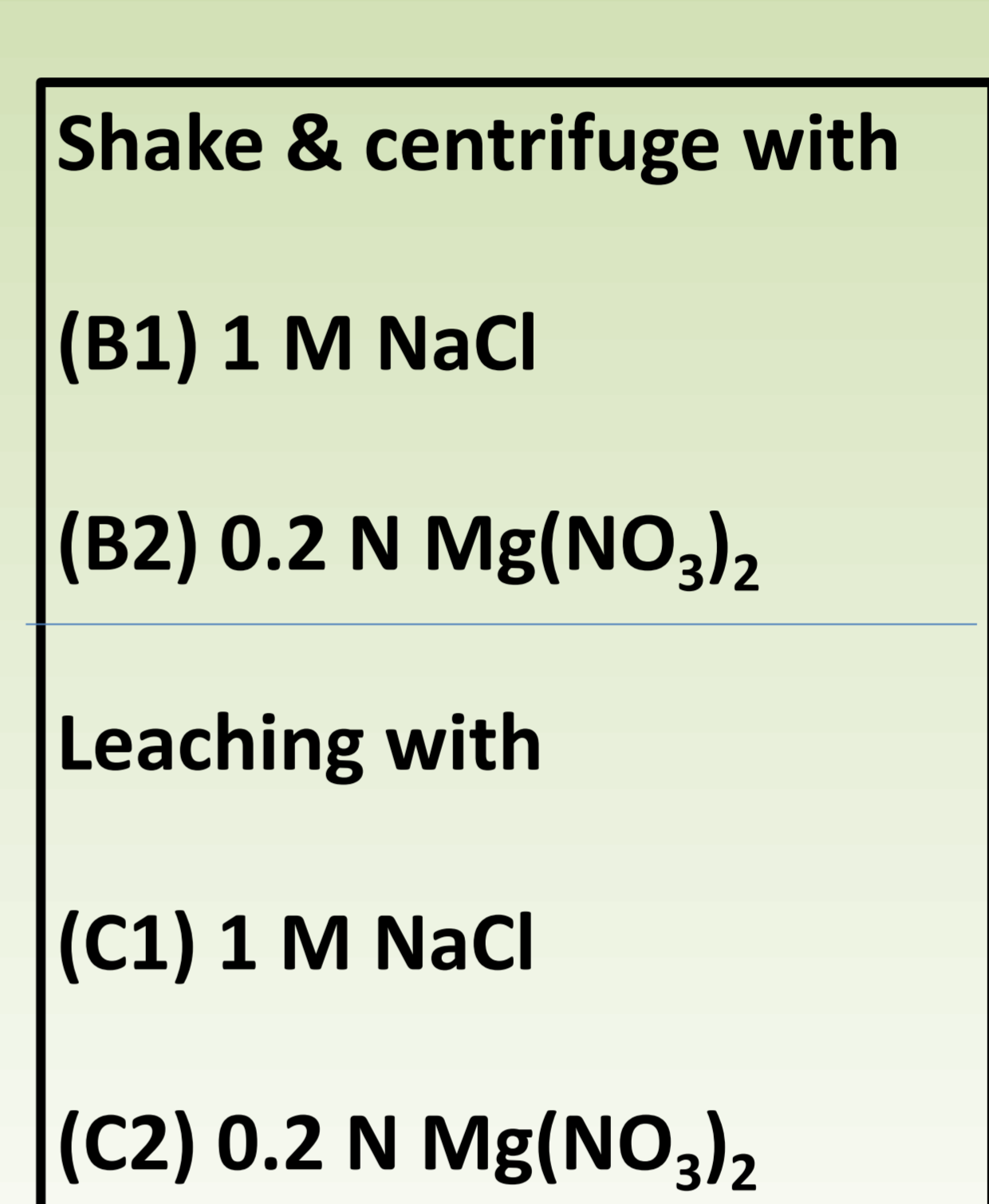
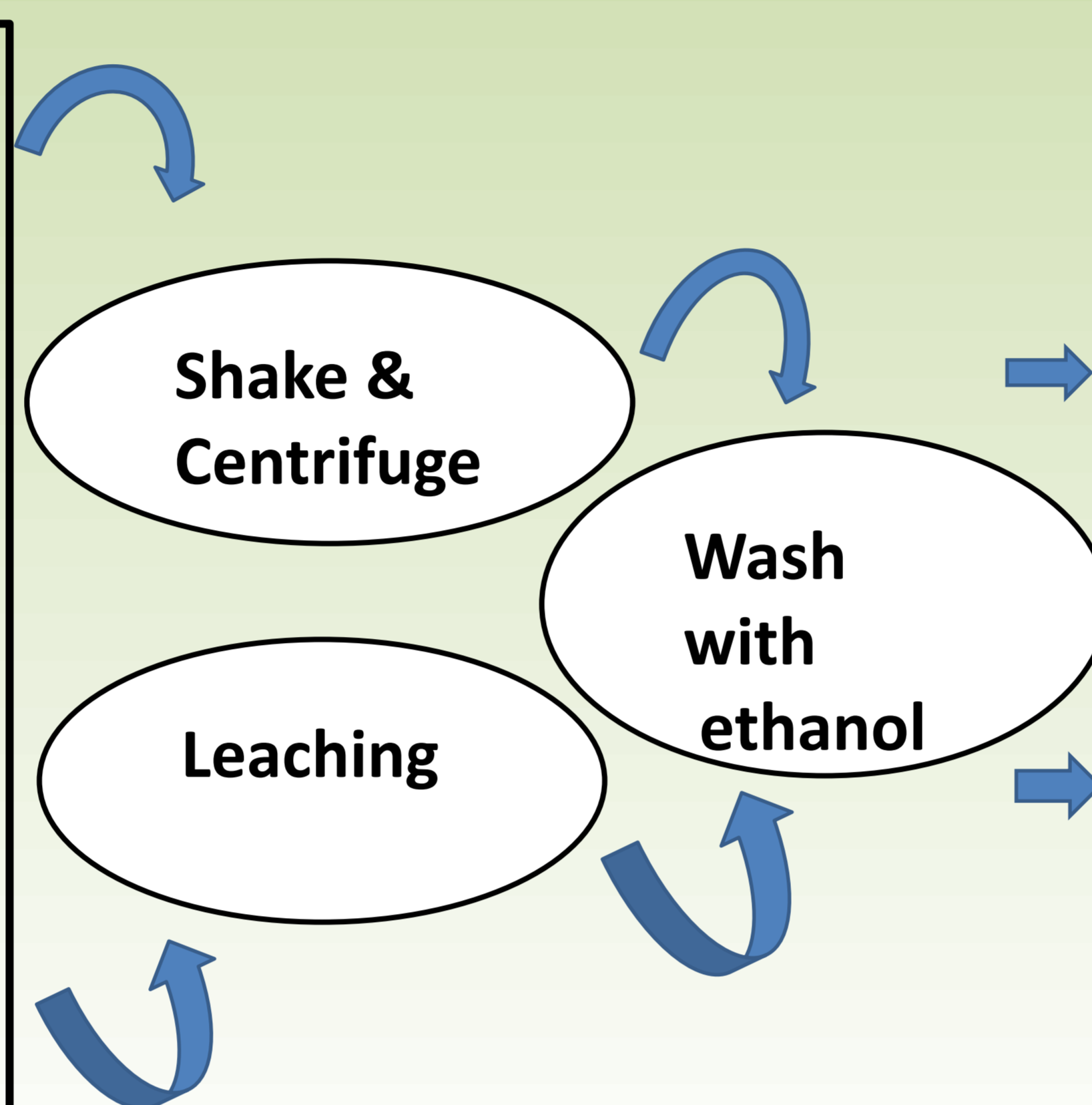
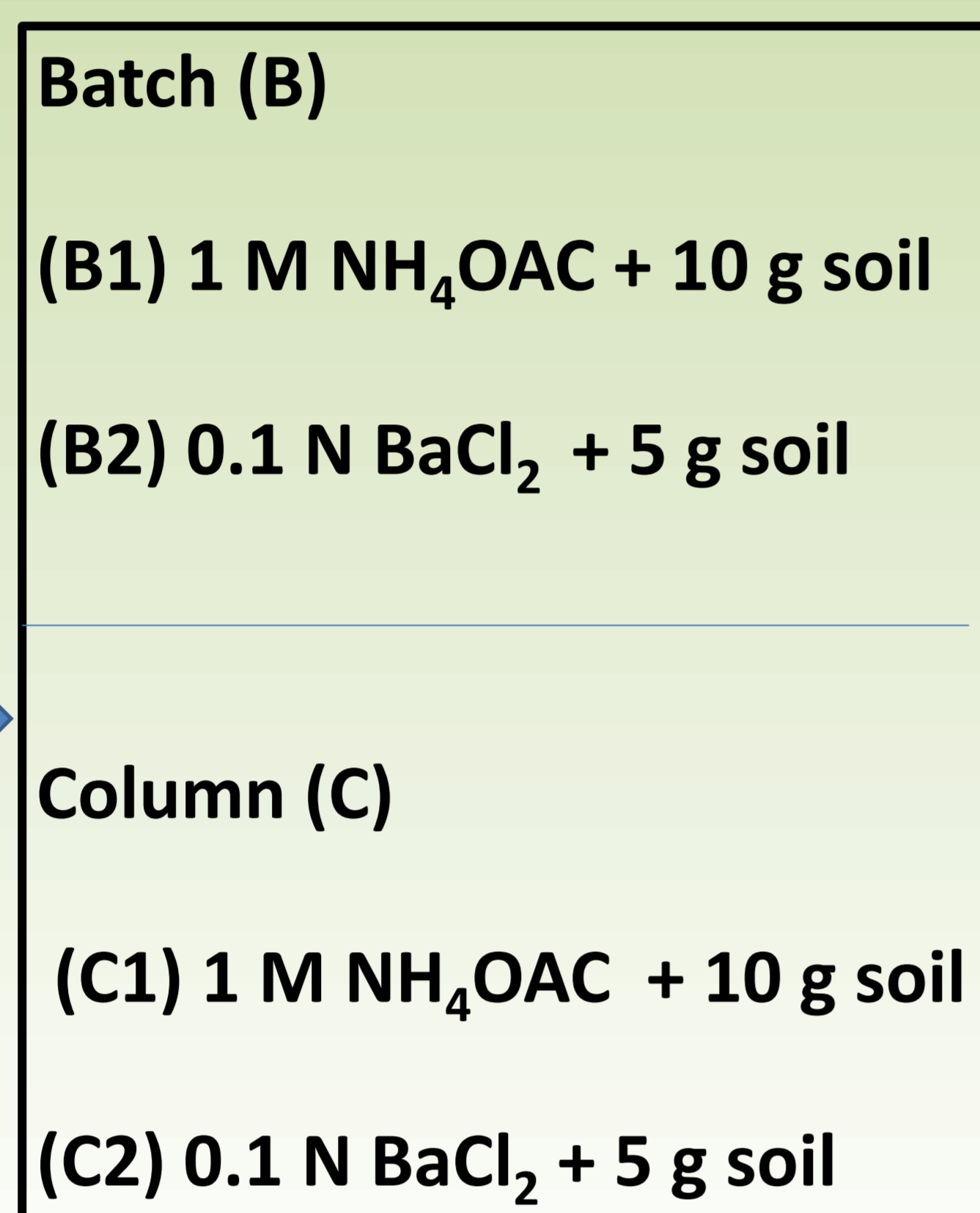
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**Introduction** The chemical fertility of a soil is related to the concentration and availability of key cations and anions in the soil system. The soil system is a complex ensemble of solid, aqueous and gaseous fluxes that are in dynamic equilibrium. The total amount of cations that can be retained electrostatically on soil surfaces is termed the cation exchange capacity (CEC). A measurement of CEC is one of the few techniques used to understand the solid interface of soil and its likely association to solution. The relationship between soil pH, soil texture and CEC across a range of 32 different soils was studied using different extract solutions by column and batch methods under different environments. The higher the exchange capacity, the more effective the soil is at retaining nutrients and other elements which are differentially impacted by pH and texture.

**Table 1. Soil types (World Reference Base) of the 32 soils used in this study.**

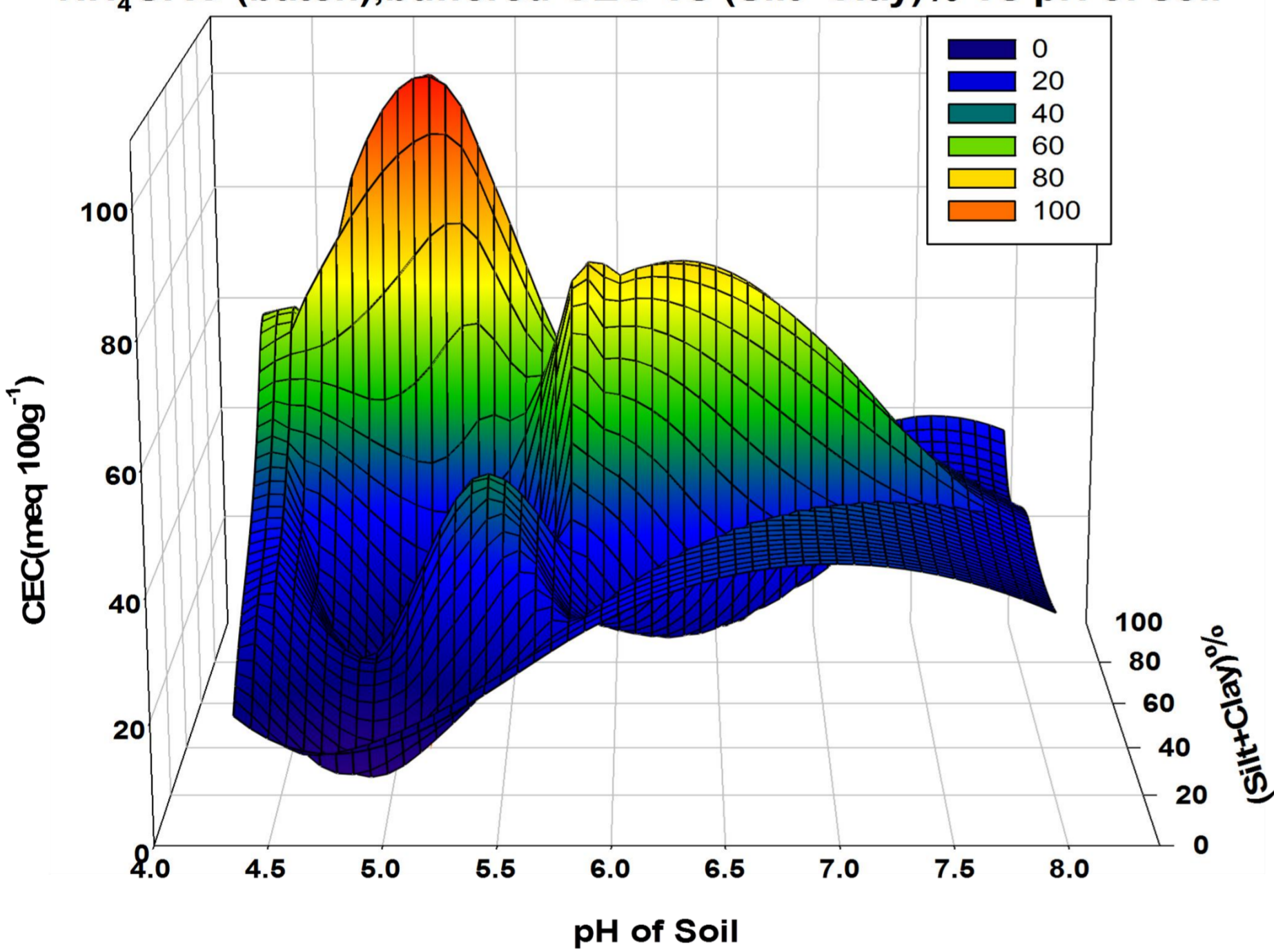
Andosol	Podzol	Chernozem	Ferralsol	Cambisol	Andosol	Anthroposol	Fluvisol	Leptosol
2	8	2	1	10	1	1	1	6

## Methods

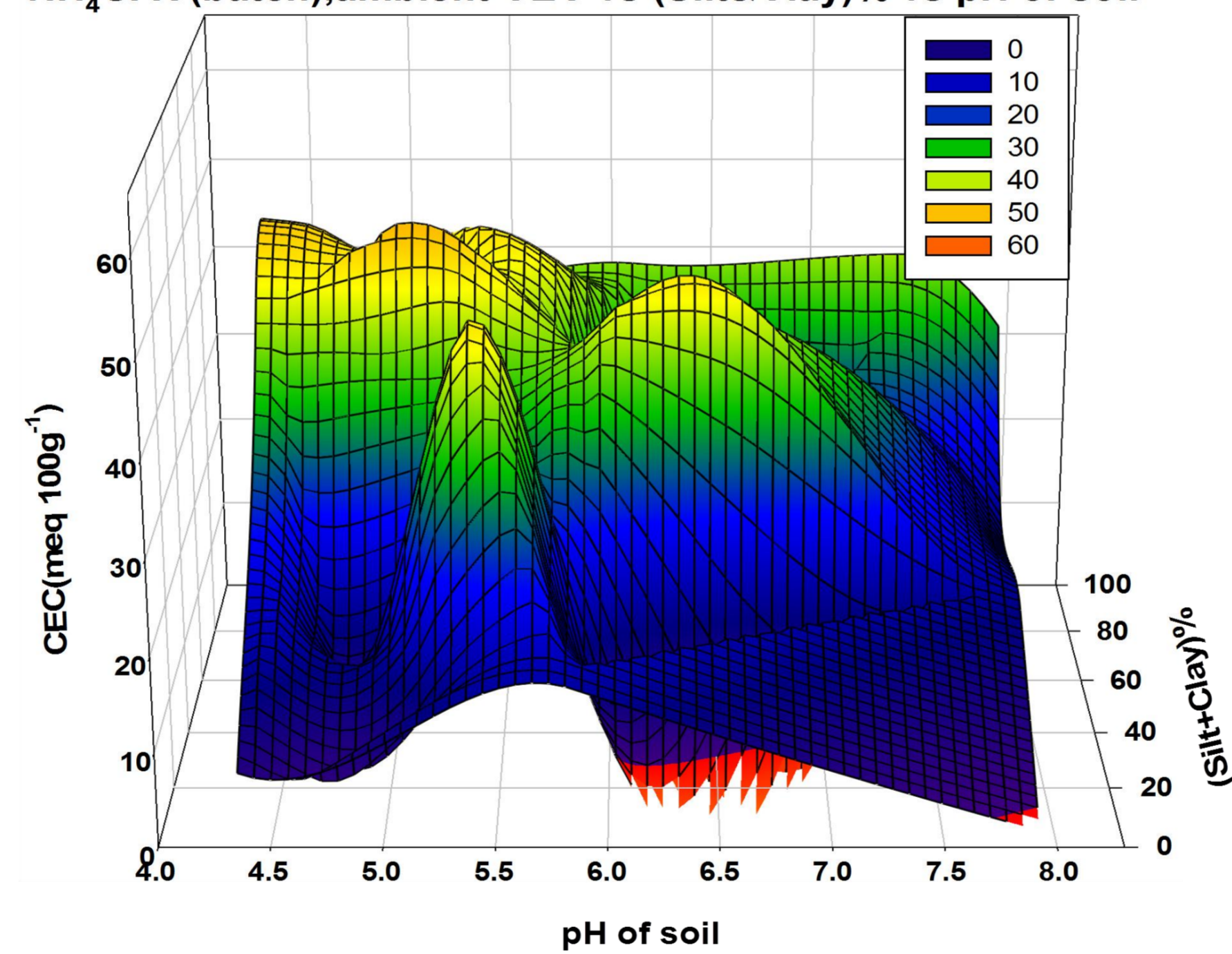


## Results

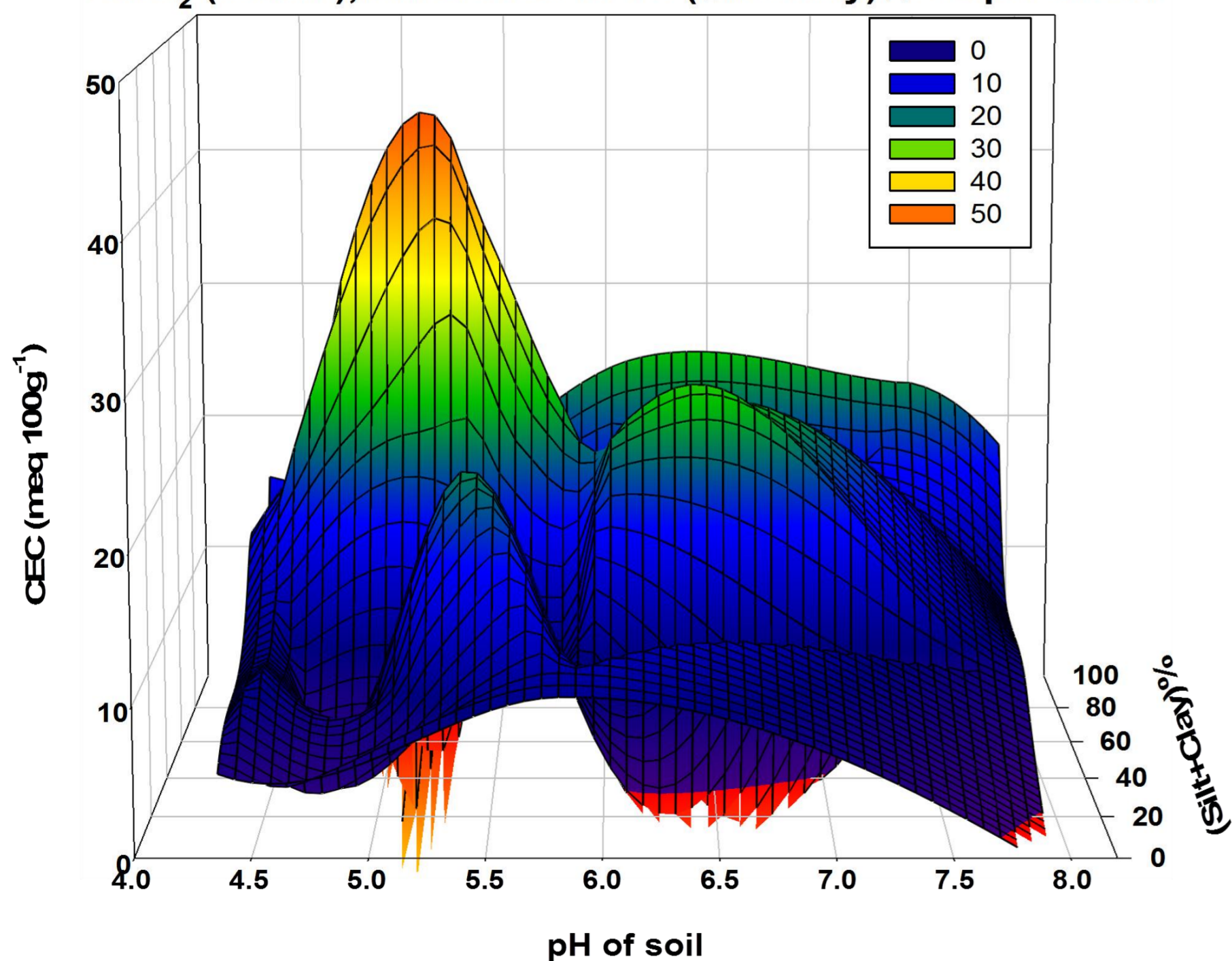
NH<sub>4</sub>OAC (batch),buffered CEC Vs (Silt+Clay)% Vs pH of soil



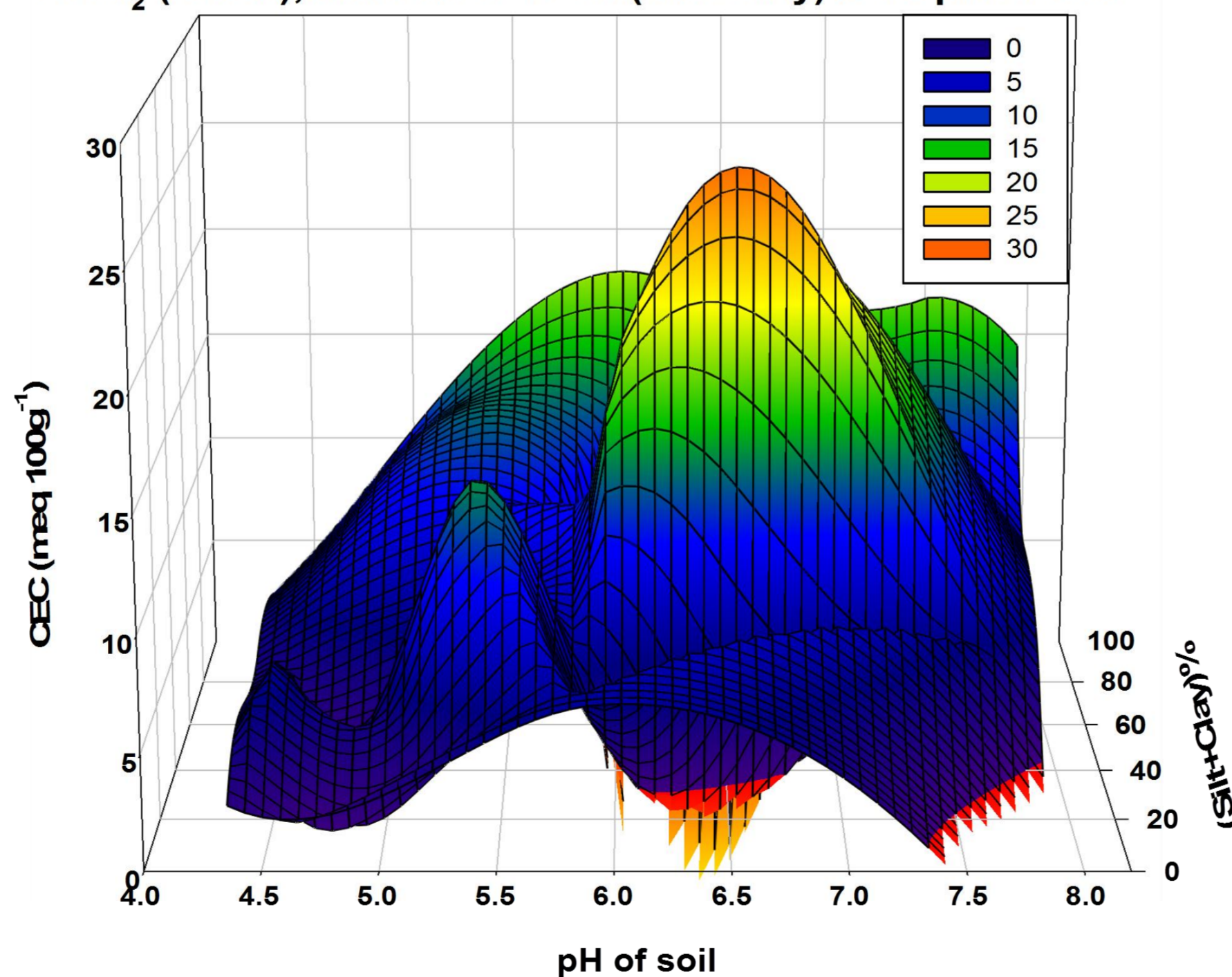
NH<sub>4</sub>OAC(batch),ambient CEC vs (Silt+Clay)% vs pH of soil



BaCl<sub>2</sub> (batch ),buffered CEC Vs (Silt+Clay)% Vs pH of soil



BaCl<sub>2</sub> (batch),ambient CEC Vs (Silt+Clay)% Vs pH of soil



## Discussion and Conclusion

The values of CEC were higher in the NH<sub>4</sub>OAC (B1) and BaCl<sub>2</sub> (B2) methods than the NH<sub>4</sub>OAC (C1) and BaCl<sub>2</sub> (C2) methods when conducted at ambient pH (p=0.0134 & p=0.023 ). The value of CEC in both of the NH<sub>4</sub>OAC (B1 & C1) method was greater than the BaCl<sub>2</sub> (B2 & C2) method (p=0.0112 & p=0.0073).

Positive correlations were measured between the pH of soil after extraction and the ambient pH value for each of these methods (p<0.001).

There were positive correlations between the CEC for both the NH<sub>4</sub>OAC methods and BaCl<sub>2</sub> methods and the soil pH.

The value of CEC as assessed by NH<sub>4</sub>OAC(B1 & C1) and BaCl<sub>2</sub> (B2 & C2) in ambient soils was lower than that of NH<sub>4</sub>OAC and BaCl<sub>2</sub> in buffered soils (all p=0.001).

The soil type was a key parameter in determining the resultant CEC and base saturation.

The NH<sub>4</sub>OAC extraction using ambient and buffered systems was very informative with respect to understanding the solid phase of soils and its relative binding efficiencies. For future work, where the soils are not excessively calcareous, the NH<sub>4</sub>OAC batch extraction method will be applied.

General trends are visible regardless of the extraction technique but adoption of standard protocols is essential to facilitate in comparative evaluation of collated data.