

## Seasonal variation of aluminium, manganese and pH in acid soils

W.J. Slattery and G.R. Ronnfeldt

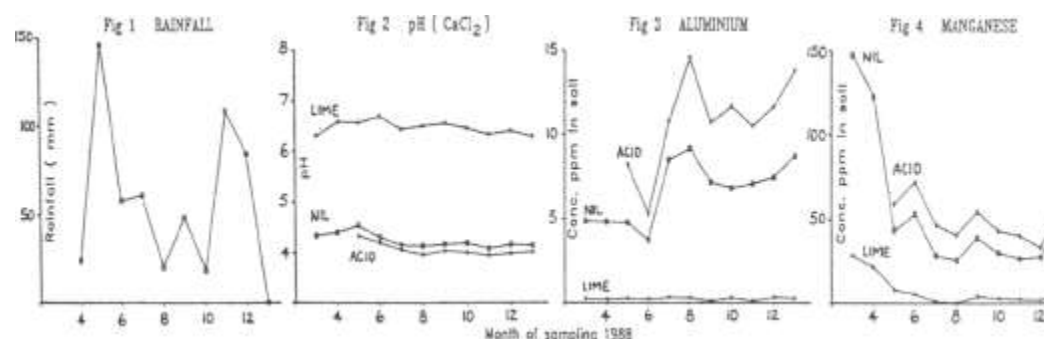
Rutherglen Research Institute, Rutherglen, Victoria 3685

Methods for predicting lime requirement on acid soils usually contain an analysis for aluminium. While exchangeable Al may be defined as the amount extracted with an unbuffered salt solution (1), the amount also varies depending upon the salt solution, time of extraction and soil to extractant ratio. In this paper we describe another important variable, that of seasonal variation.

### Methods

In this experiment treatments were prepared with higher pH (+ Lime) and lower pH (+ Sulphur) values than the original (nil) soil pH, on a Rutherglen duplex red soil. Soil samples were taken at monthly intervals in the 0-10 cm depth for 11 months from March 1988 to January 1989. Al and Mn were extracted with 0.01 M  $\text{CaCl}_2$  at a soil:extractant ratio of 1:5, Al was measured colorimetrically using catechol violet and Mn was determined by atomic absorption spectrophotometry. Soil pH was measured in a soil:water ratio and soil:0.01 M  $\text{CaCl}_2$  ratio of 1:5.

### Results and discussion



Figures 1 to 4 show the seasonal variations for rainfall, pH, Al and Mn. It can be seen that variations in soil-Al and soil-Mn vary much more than pH. These variations tend to follow rainfall events which is not surprising since seasonal variations are most affected by soil moisture, temperature and biological activity (2).

More recently it has been reported that the ionic strength of soil solutions of Victorian soils vary widely throughout the year (1) and since Al and Mn were extracted with a constant ionic strength extractant then these variations may be expected. As the soils dry out the amount of  $\text{CaCl}_2$  extractable Al and Mn both increased.

From this data it can be seen that acidifying the soil has intensified the changes that occur with soil-Al and to a lesser extent soil-Mn, compared with nil plots and especially limed plots where seasonal variations are almost negligible. It would be reasonable to assume that the problem acid soils of the future will behave in a similar manner to the acidified plots. This then highlights the importance of sampling time during the year in order to minimize variations due to season. In particular diagnostic conclusions about Al and Mn toxicities using constant ionic strength extractants could only be made if the soils were sampled under the same moisture conditions each year.

1. Baker, T.G. (1988). DARA Technical Report Series 150.

2. Edmeades, D.C. (1986). Farm, Feb., 69-71.

