

# Effect of lime and compost on fluorine bioavailability and microorganisms in New Zealand horticultural soils

Mr Thangavelautham Geretharan<sup>1,2</sup>, Dr Paramsothy Jeyakumar<sup>1</sup>, Dr Christopher WN Anderson<sup>1</sup>, Dr Mike Bretherton<sup>1</sup>

<sup>1</sup>Fertiliser & Lime Research Centre, Massey University, <sup>2</sup>Department of Crop Science, Eastern University

Over a prolonged period of time with regular applications of superphosphate fertiliser to agricultural land, fertiliser-derived fluorine will gradually accumulate in the soil. There is potential for this increased load of soil fluorine to detrimentally affect soil biological processes. Increased understanding of the immediate impact of fluorine on soil microorganisms is therefore, crucial to assess the risk of F to soil biological functions such as nitrogen fixation by Rhizobium.

To assess the variability of soil fluorine between soil types as a function of soil properties, a field experiment has been designed that will analyse the level of fluorine in the horticultural soil at locations in the Manawatu, Pukekawa and Canterbury. Each field location has a long history of superphosphate application. In each location, soil pH levels ranging from 5.6 to 7.0 will be achieved by the addition of fine elemental sulphur (100% S) and Aglime (80% CaCO<sub>3</sub>). Amendment rates to of sulphur and lime have been determined based on a detailed preliminary laboratory incubation study. A commercial compost is to be applied at a range varying from 0 to 50 ton/ha to achieve different levels of organic matter in the soil. Periodical soil samples will be collected to measure soil F, total soil microbial activity, iron and aluminium concentration, and total phosphorus in the soil. The impact of elevated F on soil microorganisms, and soil and management factors affecting the availability of soil F at these three field conditions, will be presented in this paper. The potential to use lime and compost to control F bioavailability in the different soil types will also be discussed.