Chapter 2

Sources of acidity

Soil acidification is a naturally occurring process that has been accelerated by changed landuse such as, agricultural and forestry production on some soil types throughout the high rainfall ecosystems of Australia.

Granite soils

Soils in Victoria derived from granite are naturally acid, however a rapid decline in pH of many soils has been recorded since the commencement of land clearing and the introduction of intensive legume pastures and crops. Unlike the northern hemisphere, soil acidification due to pollution from acid rain is not considered a major problem in Australia (Porter 1995).

Table 4. Natural and man made impacts on soil acidity.

Natural	Man made
• Weathering of rock	• Land clearing (product removal)
• Build up of organic matter (peats)	• Agricultural production
• Native legumes	• Introduction of legume crops

Farming practices

Declines in soil pH have occurred under a range of soil types and farming practices. These declines are measured through comparing agricultural soil to that of nearby land in its “natural state”, or by measuring the change in pH over long periods of time, which represents the rate of acidification. In a recent survey of 114

cropping soils in Northern Victoria, surface soil pH values were found to be significantly lower than current estimates as illustrated in Figure 3 of this report (Slattery *et al*. 1996). These sites have been benchmarked for future monitoring of soil condition due to current farm management practices.

Rates of acidification are generally two to three times higher where legumes are used in the rotation compared to non-legumes (Slattery *et al.* 1992). For mixed cropping practices which rotate cereal and grain legumes acidification of the soil is dependant upon the frequency of legume used in the rotation, as well as soil factors such as organic matter and soil type. Much lower rates of acidification have been observed for mixed permanent annual and perennial pastures (Ridley *et al.* 1990a).

Several key actions have been suggested as a means of managing acid soils. These include; modifying the practice to reduce the rate of acidification, breeding plants for tolerance to acid soil conditions, applying lime and changing the land use (Scott *et al.* 2000)

Soil type and climate

The rate of pH decline is also related to the amount of organic matter and clay present in the soil (Aitken and Moody 1994) as these components of the soil matrix help to prevent pH decline. Clearly the rate of acidification will vary according to the type of rotation, soil type and the climatic region in which plants are grown.

In Victoria about 62% of the total land area is affected by surface soil acidity (State of the Environment Report 1991). Although currently 23% of the total agricultural land is suffering yield penalties due to acidity, the potential declines are far greater than this.