Current Practices and Extension on Acid Soils in Victoria

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Soil acidification is becoming a priority issue for farmers and service providers in the high rainfall zone (>600mm/year). The target pH for farming systems in this zone is pH5 (measured in calcium chloride). It is acknowledged that enterprise cash flow, which affects allocation of resources to land management, is the primary barrier to rapid adoption of amelioration strategies. One third of the Victoria's agricultural land has a pH<5 and a further one third is at risk.

It is recognised that effective extension must link producer priorities with soil acidification in order to integrate amelioration of acid soils with other land management methods. Extension has moved away from the "single issue" concept facilitating acid soil awareness and education to broader catchment management activities focused on soil health. In this way, soil fertility, crop, pasture persistence and production and salinity are linked to soil acidification.

High financial returns at the farm gate drive lime usage. In acid soil regions, industries such as horticulture, dairy production, canola cropping and pasture systems for high quality meat production account for the most lime usage. Common application rates vary from 2.5 to 5 t/ha.

Description of Practices

Most land managers are aware of the techniques that will assist in ameliorating acid soils. These are:

- Application of liming material
- Use of acid tolerant plants
- Use of management practices that reduce the rate of acidification.

Extent of Practices

1. Application of liming material

Within Victoria liming material is predominantly naturally occurring crushed or sieved limestone, some industrial by-product and lime sands (predominantly calcium carbonate) and dolomites (crushed or sieved deposits of calcium and magnesium carbonate) and variations between.

Table 1: Estimate of lime used in tonnes for particular regions of Victoria, 98/99

Region	Estimated Amount – Tonnes
North East Victoria	150,000
Central Victoria	70,000
Gippsland	100,000
Western District	50,000
Est State Production/use	**370,000**

Source: Hollier pers.com.(2000).

NB: this is an estimate of lime sold into Victoria. South Australian lime suppliers sell interstate particularly into Victoria and lime source from New South Wales is used in the Riverine Plains area of North East Victoria.

The Cooperative Research Centre for Soil and Land Management reported significant increases in lime use in Victoria. Table 2 describes the amounts of limestone production for agricultural purposes in tonnes for particular years. These estimates were compiled from data supplied by the Department of Mines.

Table 2: Amount of limestone production used for agricultural purposes in particular years

Year	Limestone production for Agricultural Purposes (tonnes)
91/92	210,000
92/93	149,00
93/94	150,000
94/95	218,040
95/96	281,112

Source: Roarty (1997)

Costs of Agricultural Lime
Agricultural crushed limestone ex-works from $20 to $45/t
Dolomite is around $40/t to $50/t

Lime Spreading Costs
Generally around $12 to $15/t

Lime Cartage Costs
Will vary with distance from $5/t close to pit to about $15/t 100kms from the lime pit.

Rates of lime spread at 2.5 t/ha will cost around $90 to $190/ha.

Agricultural Lime Regulations

There are limited regulatory controls on agricultural lime quality in Victoria with suppliers required to label lime quality and notifications of toxic elements, human health issues, etc

2. Use of Acid Tolerant Plants

The use of acid tolerant plants is widespread in the higher rainfall grazing areas.

Many producers in the high rainfall zone rely on moderately to highly tolerant pasture species (eg subterranean clover, ryegrass, cocksfoot)

dominate pastures. Since the mid 1990's there has been a revival in the establishment of perennial systems (phalaris) for on-farm water management. This trend is reflected in the increased lime usage. The renovation of a pasture or sowing a dryland crop to an acid sensitive species maybe delayed until lime has been suitably incorporated, for example when sowing lucerne, phalaris or canola. Acid tolerant species are generally selected unless a liming program is in place for both grazing and dryland cropping enterprises (eg ryegrass/cocksfoot, triticale, oats, some wheats).

Acid tolerant plants have a limited future where they continue the rate of acidification. There is growing interest in low input native pastures for light textured, rocky or steep areas where it is difficult to apply lime. Seed quantity/ price and management appear to be limiting adoption.

3. **Use management practices which reduce the rate of acidification**
   The contribution of management practices to the reduction of acidity is complex and variable. Practices, in Victoria include:

   - ***Use of less acidifying form of fertiliser***. Within horticultural crops such as fruit and vines the replacement of urea with calcium nitrate or equivalent is becoming common particularly on soils which have developed an acidity problem. This is similar to the South Australian production systems on acid soils.

   - ***Sow perennial pasture in non-cropping areas***. The establishment of deep-rooted perennial pastures is increasing and linked to productivity and environmental gains. Integrating perennial species into dryland farming systems is actively supported in State endorsed catchment management plans.

     Environmental gains tend to focus on reducing recharge and salinity, increasing ground cover and reducing erosion rather than the ability to reduce N leaching and slow rates of acidification.

   - ***Feed hay onto paddock in which it was cut where possible to recycle nutrients and alkalinity***. The use of rotating hay/night paddocks is used particularly on dairies and horse properties to reduce acidification of paddocks where hay has been sourced. Adoption levels are probably relatively low but have increased over the last few years.

State Programs

Extension Programs

In Victoria acid soil extension is currently integrated into State programs (for example, TopCrop, Beef Cheque, Prograze) as part of soil management. There is no structured acid soil extension program across the State.

The Victorian branch of the Australian Fertiliser Services Association (AFSA) took an active role in promoting soil acidity awareness in the early to mid 1990's in conjunction with the Department of Natural Resources and Environment.

Funding for acid soil extension has been obtained from the Natural Heritage Trust, Land and Water Resources Development Corporation and Department of Natural Resources. The Victorian Limestone producers and AFSA have contributed to extension.

There has been no jointly funded project in acid soil extension in Victoria since 1996. The development of a Soil Health Strategy for the North East Catchment management Authority has provided 15 workshops for producers. A component of this education and training has been soil acidity awareness and option assessment.

Extension Publications

Monitoring and Managing Acid Soils – first printed 1993, reprinted 1995 DNRE

Acid Soil Action – Investment for your soil now and for the future – LWRRDC 1999

Soil health in North East Victoria – a component of the North East Soil Health Action Plan, DNRE 1999