

APPLICATION OF LIME AND GYPSUM TO SUB SOIL

Frank Kernebone
Agricultural Engineering Centre,
Glenfield, NSW.

If pasture or crop growth and yields are being limited by subsoil problems such as acidity or sodicity it is desirable to have techniques for placing soil amendments directly where the problem lies for the quickest response. The principal amendments are lime and gypsum which are broadcast on the surface and may be incorporated into the top soil. However there is virtually no movement of lime down the profile and the movement of gypsum is a very slow process. Deep incorporation of the amendment with the subsoil is a time-consuming and costly operation and destroys permanent pasture in which subsoil acidity is often a problem.

Incorporation with the whole volume of subsoil may not be necessary for situations where roots can grow down treated pathways. Large reductions in application rate may therefore be possible. Such pathways can be generated by subsoiling tools that do not destroy pasture such as the Paraplow and Agrowplow. The subsoil disturbed by such tools can be treated by injecting concentrated suspensions of the amendments behind the tines. These suspensions are prepared by mixing around 60 percent by weight of finely powdered material with water. The suspensions settle slowly and are thin enough to pump and spray. Coarser powders may require elimination of large particles and the use of suspending agents particularly if the suspensions are to be stored or transported.

Sets of equipment for injecting concentrated suspensions into small trial plots have been mounted on a 3-tined paraplow and a 5-tined utility Agrowplow. Both sets have a 200 litre horizontal, cylindrical tank and a agricultural spray diaphragm pump of about 65 litres per minute capacity driven by a petrol motor. A 3-way valve is used to direct flow either to the injection tubes mounted behind the tines or back to the tank for jet agitation between runs. Injection rate is controlled by a combination of pump speed, tractor ground speed, by-pass and spill-back flow rates and suspension concentration. The paraplow tines are each fitted with three flat-jet spray nozzles aligned with the tines which are angled sideways at 45°. The Agrowplow tines each have two flat-jet nozzles aligned vertically plus a flood-jet nozzle that gives a horizontal spread at the base of the cut.

Trial plots in crops and pasture were injected with lime and gypsum using the Paraplow near Wagga in May-June, 1985. Trial plots in pasture have been injected with suspensions of lime, superphosphate and Canberra sewage ash near Yass and Braidwood using the Agrowplow in March-May this year (1986).

Broadacre injection of amendments in suspension is achievable but will require suspension preparation equipment and a larger supply tank, either towed or tractor-mounted. The injector could also be supplied by hose from stationary tank. The pneumatic injection of powdered amendments using a modified air seeder is to be investigated as an alternative technique that will avoid the need to transport water.