Chapter B8. Dispersion

PURPOSE OF THIS CHAPTER

To outline the principles of dispersion

CHAPTER CONTENTS

- testing for dispersion
- applying gypsum and lime

ASSOCIATED CHAPTERS

- A3 'Features of soil'
- B6 'Does my soil need gypsum'?
- D4 'Slaking and dispersion'
- D5 'Sodic soil management'

TESTING FOR CLAY DISPERSION

It is easy to test a soil for dispersion. Drop small, dry crumbs of soil (3 to 5 mm diameter) into rainwater or distilled water and leave undisturbed. If a milky halo of dispersed clay develops around the crumb, it is likely that gypsum would improve the soil structure. In very dispersive soil, the halo will develop within 10 minutes. A moderately dispersive soil will show a halo within two hours. A non-dispersive soil will not show a halo at all, even by the next day.

If a test shows your soil to be dispersive, have the soil analysed for exchangeable cations and electrical conductivity in a laboratory. Sample the subsoil as well as the topsoil to determine the extent of the problem. Analysis results showing high exchangeable sodium and low electrical conductivity indicate a soil prone to dispersion. Generally, a soil with an exchangeable sodium percentage above 5 is prone to disperse on wetting. However, soil with an exchangeable sodium percentage lower than 5 may disperse if the electrical conductivity is exceptionally low (very low salinity).

You may also try some test strips of gypsum at various rates (for example, try 2.5 t/ha and 5 t/ha). If you decide to treat a whole paddock with gypsum, leave a strip untreated to show the benefits. If the treated soil responds to gypsum, you will notice increased soil friability, less power needed for tillage, improved infiltration of rain, less surface waterlogging (the soil surface dries out sooner after rain) and better seedling emergence. Measure yields on the treated and untreated strips, even if the response is not visible.

If gypsum improves soil condition but there is little yield improvement, something else may be limiting plant growth—possibly plant nutrients. Improvement in water infiltration can, in a wet year, result in greater leaching of nitrogen. Improved nitrogen nutrition may be needed. On some soils sulfur is deficient. Crop response to gypsum may then be a response to the sulfur (gypsum is calcium sulfate) rather than a response to improved soil structure.

A test strip of gypsum is more informative if combined with test strips of other likely remedies, such as nitrogen, phosphorus and sulfur fertilisers.

GYPSUM AND LIME

Applications of gypsum (calcium sulfate) and lime (calcium carbonate) supply calcium to soil. Lime is preferable for strongly acid soils (pH ($CaCl_2$) less than 5). Lime is not recommended for alkaline soils. Gypsum is more soluble than lime and is more commonly used; it acts quicker but leaches sooner. Lime has a slower acting but longer lasting effect. A combination of gypsum and lime may be a good compromise on soils with pH ($CaCl_2$) between 5.0 and 6.5. See Chapter B6 for gypsum application rates.

FURTHER READING

Agfact AC.10 Abbott, T. S., McKenzie, D. C. 1996. *Improving soil structure with gypsum and lime.*