Trial 24

Results of Long term sodicity trial for 1995

Jock Churchman, CRC for Soil & Land Management, Adelaide

There are no significant differences between average yields for different levels of applied gypsum in the trial in 1995. There are also no significant differences between average yields for the different tillage treatments.

There are several possible explanations for the lack of response to gypsum. These include:

1. *It was a good year. The adequate rainfall meant that the constraints imposed by sodicity were not able to influence crop growth.* However, although growth (of peas) was good overall, the possibility that uniformly (relatively) good growth occurred in spite of rate of gypsum application is not supported by observations at the other sites in Victoria where similar gypsum application trials were conducted. At Nhill, for instance, there were very marked differences in growth due to gypsum applications in 1995. Anyone who visited the field day there in November will have observed some striking effects of gypsum application.

2. *The number of passes with a vehicle to add each extra amount of gypsum led to increments of extra compaction, giving rise to physical constraints which balanced out any benefits of gypsum.* However, any effect of compaction should have been exhibited in differential rates of germination. This was not the case, so compaction can be eliminated as an explanation of the lack of effect of gypsum on yields.

3. *The soil is only slightly sodic*. However, results we have just obtained from some experiments being conducted now in the CRC show that, when all salt was washed out of a sample of the soil taken from 10-25 cm at the trial site, it required as much as 5 tonnes/ha of gypsum to make the soil non-dispersive. Although this result is tentative and also cannot yet be used as a guide for application rate of gypsum because one sample almost certainly will not be representative of the whole paddock, it does show that at least some of the soil there is sodic.

4. *Although the soil is sodic, there is another constraint to plant growth which overcomes any effect gypsum has in correcting sodicity.* Another aspect of our current experiments showed that, when gypsum was simply added to the sample of soil taken from 10-25 cm, without prior washing of any salt from the soil, only 0.1 tonnes/ha (100kg/ha) gypsum was sufficient to prevent dispersion. Dispersion is prevented as a result of the "electrolyte effect" and the soil treated with this small amount of gypsum would remain non-dispersive until the gypsum was washed out of the system by rain. It represents an extremely low gypsum requirement for this purpose, with other Victorian soils in our set requiring up to 1 tonne/ha to prevent dispersion. The result makes sense when we discover that the soil in the trial site has a high electrical conductivity (EC) at quite shallow depths. EC is a measure of <u>salinity</u>.

<u>Conclusions</u>

The soil in the trial site shows damaging levels of <u>salinity</u> at quite shallow depths. Salinity prevents crop growth largely by depriving the plants of water. The plants struggle at lower levels of salinity and die at higher levels. Yields of many crops become restricted at EC levels somewhere between 0.4 and 0.8 dS/m (see Natalie Hunt and Bob Gilkes "Farm Monitoring Handbook", University of Western Australia, 1992). EC's within this particular range invariably occur above 25 cm in the trial site.

Crop yields will be affected by limitations to root growth from salinity rather than by the effects of sodicity. Very little gypsum is required to overcome dispersion brought about by sodicity. Poor root growth, resulting from salinity, will result in poor efficiency of water use. A catchment-wide approach would be required to correct the salinity problems.