Table 1. CALCIUM, STRONTIUM AND MAGNESIUM IN WHOLE CELLS AND CELL WALLS OF *Rhizobium trifolii*
(mmoles divalent cation per gram dry cell substance)

| | Whole cells grown with added* | | | Cell walls grown with added* | | |
|---|---|---|---|---|---|---|
| | (i) Ca + Mg | (ii) Sr + Mg | (iii) Mg | (iv) Ca + Mg | (v) Sr + Mg | (vi) Mg |
| Calcium | 0·062 | 0·006 | 0·007 | 0·081 | 0·023 | 0·047 |
| Strontium | — | 0·057 | — | — | 0·080 | — |
| Magnesium | 0·064 | 0·080 | 0·154 | 0·016 | 0·013 | 0·024 |
| Total divalent cation | 0·126 | 0·143 | 0·161 | 0·097 | 0·116 | 0·071 |

* Growth medium all with 1 mmole total divalent cation, either as 0·5 mmole magnesium + 0·5 mmole calcium or strontium, or 1·0 mmole magnesium.

Table 1 shows that the total of divalent cations in whole cells (column ii) and separated walls (column v) of organisms grown in strontium solution was slightly higher than in cells with adequate calcium (columns i and iv), which perhaps reflects the lower efficiency of strontium in supporting growth and protecting against lysozyme[3]. The amount of strontium in the walls of cells grown in strontium (column v) was very similar to the amount of calcium in the walls of bacteria with adequate calcium (column iv). Without added calcium or strontium, more of the trace calcium of the medium was concentrated in the walls (column vi) than when strontium was present to replace it (column v).

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[1] Vincent, J. M., and Colburn, J. R., *Austral. J. Sci.*, **23**, 269 (1961).
[2] Humphrey, B., and Vincent, J. M., *J. Gen. Microbiol.*, **29**, 557 (1962).
[3] Vincent, J. M., and Humphrey, B. A., *Nature*, **199**, 149 (1963).

# BIOLOGY

## Differences in Susceptibility to Iron Chlorosis of Grass Species grown on Blanket Peat

VARIETAL differences in nutrient assimilation and yield response have been reported for several plant species[1,2]. The role of iron in the nutrition of certain crop plants has received particular attention. Varieties of soyabean differed in their ability to absorb iron from their growth media, especially when available iron was low[3]. Similar differences are reported for maize varieties[4].

The occurrence of iron chlorosis in plants grown on calcareous soils is well known and has been reviewed in detail[5]. It is generally not associated with soils of low *p*H, as a result of the greater availability of iron under acidic conditions. Iron chlorosis has been observed, however, on acid soils in Ireland[6], Finland[7] and New Zealand[8].

On blanket peat (*p*H 5·0–5·4) in western Ireland, iron chlorosis is a serious limiting factor in grass production. In a randomized block experiment (three replications) at the Peatland Experimental Station, Glenamoy, several grasses were individually sown with white clover (*Trifolium repens*) in 1963. Plot size was one square perch (25·3 $m^2$) and all herbage produced was cut and removed. Chlorosis became evident during periods of active spring growth. The date of occurrence was determined by the seasonal growth pattern, and varied for different species. The number of chlorotic and non-chlorotic leaf blades was estimated in April 1965, using the point quadrat (100 points per plot) method of botanical analysis. To overcome the seasonal growth effect, counts were made three times at intervals of 10 days.

The results are given as a percentage of chlorotic leaf blades (Table 1), the highest of all three estimations being taken as a measurement of susceptibility to chlorosis for each species. The sown grasses varied greatly in their susceptibility, the chlorosis being sufficiently severe to result in almost complete elimination of certain species and varieties, for example, *Phleum pratense* (*S*.48 and *S*.50) and *Dactylis glomerata* (*S*.37).

Table 1. PERCENTAGE CHLOROSIS IN GRASS SPECIES

| Species | Variety | Chlorosis (per cent) | *S.E.* |
|---|---|---|---|
| *Phleum pratense* | *S*.50 | 77·9 | |
| | *S*.48 | 73·4 | |
| | *S*.51 | 40·0 | ± 10·6 ‡ |
| | 'Omnia' | 25·6 | |
| | *S*.352 | 23·4 | |
| *Dactylis glomerata* | *S*.37 | 72·3 | |
| | *S*.143 | 62·5 | |
| | *S*.345 | 55·2 | ± 14·8* |
| | 'Danish' | 50·1 | |
| | 'Ferdia' | 35·0 | |
| *Festuca pratensis* | *S*53 | 63·6 | ± 4·6 ‡ |
| | 'Danish' | 42·7 | |
| *Lolium perenne* | *S*321 | 32·5 | |
| | 'Irish' | 23·4 | |
| | *S*.24 | 22·7 | ± 10·0 *N.S.* |
| | *S*.23 | 16·8 | |
| | 'N. Zealand' | 15·1 | |
| *Festuca arundinacea* | *K*.31 | 10·2 | ± 2·2 ‡ |
| | *S*.170 | 0·1 | |
| *Alopecurus pratensis* | *Bh*284 | 57·6 | |
| *Festuca rubra* | *S*.59 | 1·2 | |
| *Arrhenatherum elatius* | *Bm*102 | Nil | |
| *Poa trivialis* | 'Commercial' | 1·0 | |
| *Agrostis tenuis* | ,, | Nil | |

Standard error of means of all species = ± 17·5 ‡. Significance levels: *5 per cent, ‡1 per cent, *N.S.* = not significant.

Although the iron content of the peat is low, there is evidence to suggest an interaction with other factors rather than low availability of iron. Chemical analyses showed that chlorotic tissue was slightly higher in total iron and lower in "active iron" than healthy tissue. This is in agreement with the earlier findings of Jacobson[9]. It has been suggested by Brown *et al.*[10] that the inactivation or failure of iron metabolism within the plant is a contributory factor to chlorosis.

This work has shown that grass species and varieties vary greatly in their susceptibility to iron chlorosis. Such variation could be used as a criterion in selecting plants for specific or problem soils.

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[1] Vose, P. B., *Herb. Abstr.*, **33**, 1 (1963).
[2] Bradshaw, A. D., and Snaydon, R. W., *Nature*, **183**, 129 (1959).
[3] Weiss, M. G., *Genetics*, **28**, 253 (1943).
[4] Bell, W. D., Bogorad, L., and McIlrath, W. J., *Bot. Gaz.*, **120**, 36 (1958).
[5] Brown, J. C., *Adv. Agron.*, **13**, 329 (1961).
[6] Walsh, T., and Clarke, E. J., *Proc. Roy. Irish Acad.*, **50**B, 359 (1945).
[7] Heinonen, R., *Maataloust. Aikak.*, **33**, 267 (1961).
[8] Hupkens van der Elst, F. C. C., *Intern. Soil Conf., New Zealand* (1962).
[9] Jacobson, L., *Plant Physiol.*, **20**, 233 (1945).
[10] Brown, J. C., Tiffin, L. O., Holmes, R. S., Specht, A. W., and Resnicky, J. W., *Soil Sci.*, **87**, 89 (1959).

## Effect of the Plant Alkaloid Sparteine on the Distribution of the Aphid *Acyrthosiphon spartii* (Koch.)

HOST selection in aphids seems to occur mainly after alightment but little is known, apart from the probing response, of the stimuli or receptors involved[1,2]. In an investigation of a natural population of *Acyrthosiphon spartii* (Koch.) on broom (*Sarothamnus scoparius* L.) over 3 years, adults were observed to change their feeding sites as the seed pods enlarged and this coincided with the movement of the alkaloid sparteine between various plant organs. As the petals fell many adults and some fourth instar aphids left the stems and leaves and moved on to the pods where feeding and reproduction recommenced. This movement was not a result of overcrowding because at that time there was adequate surface area on the stems and leaves.