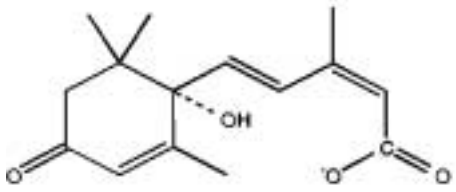
QUANTIFYING ABSCISIC ACID, THE PLANT STRESS HORMONE, AND ITS PRECURSORS DURING THE ONSET OF DROUGHT.

Andy Netting and Karina Kristensen

School of Biochemistry, University of New South Wales, Sydney, 2052.

In a recent review [1] it was proposed that the following changes occur when a plant is stressed: mechanosensitive Ca^{++} channels open in cells that are contiguous with the transpiration stream, this response being synergistically enhanced by apoplastic abscisic acid (ABA). The elevated cytoplasmic Ca^{++} then deactivates plasmalemma H+/ATPases while apoplastic ABA may activate the uptake of H^+ by a K^+-H^+-symport. These responses to water stress would therefore result in an increase in apoplastic pH.

Netting *et al.*2 found that a precursor of ABA, the 'ketone', was present in leaves and that it appeared to release ABA in response to mild stress. However, it was not clear if the ketone was already present in the leaf, was synthesised in response to mild stress or possibly both. Similarly, another compound, the 'enolate', appeared to be synthesised in response to more severe stress, but its source was not clear. As both of these compounds are possibly imine esters at the future carboxyl carbon of ABA, it is likely that ABA is released when the apoplastic pH exceeds about 7.0. In addition, the enolate contains an enol ester at the carbonyl group so that it would also be hydrolysed at about pH 7.0.



Abscisic acid
(ABA)

If we are to understand how plants transduce the adverse environmental signal of drought into the release of ABA we will need to determine the source(s) of the ketone and enolate and the conditions that induce their hydrolysis. As a first step towards achieving these aims we have developed a quantitative assay 3 for ABA and its two precursors and have measured these compounds in tomato seedlings during the onset of drought.

1. Netting, A.G. (2000) *J. Expt.* Bot. **51**, 147-58.
2. Netting, A.G., Windsor, M.L. and Milborrow, B.V. (1997) *Aust. J. Plant Physiol.* **24**, 175-84.
3. Duffield, P.H. and Netting, A.G. (2000) *Analytical Biochemistry* Accepted.