BORON TOLERANCE IN MEDICS

Breeding of pasture plants for Australian conditions can either utilize the naturalized ecotypes evolved from the initial introductions, as is largely the case with subterranean clovers, or introduce new genotypes from overseas, as has been the case with annual medics.

The registered cultivars of medics have been either introduced directly or derived from crosses using parents from the Mediterranean basin. Only Jemalong and Hannaford (barrel medics) have been successfully derived wholly from Australian ecotypes. The majority of the registered medics have resulted from the use as parents or the direct introductions of medics from Iran, Israel, Italy, Jordan, Tunisia, Portugal, Cyprus and Chile. The broader genetic base of the more recently employed Mediterranean genotypes have allowed the incorporation of characteristics enhancing productivity under Australian conditions.

The recently discovered importance of boron tolerance amongst wheat varieties has led to a similar investigation of boron tolerance in medic varieties. Soils most likely to have toxic concentrations of boron are sodic and alkaline. These are the very soils on which cultivation of medics is attempted, suggesting that boron tolerance may play a very important role in the adaptation of medic cultivars in southern Australia (and indeed many other crop and pasture plants). The screening of a medic collection in the glasshouse has indicated an extremely impressive degree of variability for boron tolerance. Symptoms associated with boron toxicity were necrosis and chlorosis around leaf margins. In pot experiments the local cultivars also exhibited a substantial range in tolerance with the more tolerant types having originated in Cyprus, Israel, Italy and Iran. The local ecotypes generally have a lower level of boron tolerance. Agronomic data indicates that the tolerant types have been grown in the areas of lower rainfall where boron toxicity is known to be more prevalent.
Table 1:

<table>
<thead>
<tr>
<th>TOLERANT</th>
<th>MOD TOLERANT</th>
<th>SUSCEPTIBLE</th>
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<tbody>
<tr>
<td>Cyprus</td>
<td>Jemalong</td>
<td>Borung</td>
</tr>
<tr>
<td>Sephi</td>
<td>Parabinga</td>
<td>Circle Valley</td>
</tr>
<tr>
<td>Paraggio</td>
<td>Sava</td>
<td>Tornafield</td>
</tr>
<tr>
<td>Harbinger</td>
<td>Ghor</td>
<td>Hannaford</td>
</tr>
<tr>
<td></td>
<td>Sapo</td>
<td>Zodiac</td>
</tr>
<tr>
<td></td>
<td>Ascot</td>
<td>Santiago</td>
</tr>
<tr>
<td></td>
<td>Serena</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kelson</td>
<td></td>
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<tr>
<td></td>
<td>Paraponto</td>
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Boron tolerance is gained by an exclusion mechanism; tolerant genotypes have lower concentrations of boron in the tissue than intolerant types. As a consequence it is likely that boron tolerant cultivars will be susceptible to boron deficiency when soil boron concentrations are low. Each cultivar will have its own range of "optimal" soil boron concentrations. Enormous variability in soil boron concentrations occurs both with depth and across a paddock. As the range between deficiency and toxicity is extremely narrow for boron there is the potential for both deficiency and toxicity to occur in the one paddock. The importance of this situation can not be overstated. Observations from a study of barley grass populations indicate that a range in boron tolerance occurs in any one population even when taken from highly boron toxic sites. Growth of these weed populations appears to be enhanced by the presence of a range in boron tolerances when soil boron concentrations are variable. A parallel strategy needs to be employed in a pasture situation. As most farmers will already be aware, the sowing of pasture mixtures has many advantages ranging from diversity in disease resistance to a prolonged period of production. The classification of the boron tolerance of commercial cultivars in terms of boron tolerance provides the information necessary to sow medics with a range of boron tolerances enabling maximal productivity in the presence of variable soil boron levels.

David Moody  
Department of Agronomy  
Waite Institute
INVITATION

From the Department of Agriculture, Agricultural Bureaux, the Crop Science Society and the Agricultural Chemical Retailers Association

to attend

A HERBICIDE WORKSHOP

To be held at:  * Roseworthy Agricultural College. Stefanson Theatre. 
Tuesday March 21st 1.30 pm - Dinner - Close (approximately 9.00 pm)

* Crystal Brook, Football Clubrooms, Wednesday March 22nd
1.30 pm - Dinner - Close (approximately 9.00 pm)

SPEAKERS AND TOPICS TO INCLUDE:

* Dr. Steve Powles, Dr. Joe Holtum, Dr. Ron Knight and Mr. John Matthews, Waite Institute
  - Understanding Herbicides Better
  - Herbicide Residues in soils and Plants
  - Environmental Fate of Herbicides
  - Movement of Herbicides into Soils and Plants
  - Herbicide Resistance

* Rick Maddin, Department of Agriculture, W.A., Herbicide Research Officer
  - Spraying oils
  - Pre Sowing Weed Control
  - Herbicide Spray Drift Reduction

* Dr. Allan Mayfield, Department of Agriculture,
  - Local Trial Results
  - "Chemical Act" Update

REGISTRATION FOR ATTENDANCE IS REQUIRED.

Roseworthy Workshop Enquiries and Registration to:
  J. Hannay  (085) 621355
  C. Butler  (085) 249069  - wk
  (085) 223029  - hm

Crystal Brook Workshop Enquiries to:
  P. Smith  (086) 641408
  R. Kerin  (086) 362336
<table>
<thead>
<tr>
<th>Subject</th>
<th>Speaker</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>M. I'Anson</td>
<td>1.30-1.40</td>
</tr>
<tr>
<td>Discovery and safety of herbicides</td>
<td>S.B. Powles</td>
<td>1.40-2.10</td>
</tr>
<tr>
<td>What happens to herbicides in the environment</td>
<td>S.B. Powles</td>
<td>2.10-2.40</td>
</tr>
<tr>
<td><strong>Question Session</strong></td>
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<td>2.40-3.00</td>
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<td>Factors affecting the efficacy of herbicides</td>
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<tr>
<td>1. Uptake through the soil and foliage</td>
<td>J.M. Matthews</td>
<td>3.00-3.45</td>
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<td><strong>Coffee Break</strong></td>
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<td>3.45-4.00</td>
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<tr>
<td>2. Selectivity between weed and crop</td>
<td>J.A.M. Holtum</td>
<td>4.00-5.00</td>
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<tr>
<td><strong>Question Session</strong></td>
<td></td>
<td>4.40-5.00</td>
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<tr>
<td>Herbicide resistance in weeds</td>
<td>R. Knight</td>
<td>5.00-5.40</td>
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<tr>
<td><strong>Question Session</strong></td>
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<td>5.40-6.00</td>
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Survey

Would members please complete the attached survey and return to:

Mr. John Heap,
Department of Agriculture,
Northfield Research Laboratories,
G.F.O. Box 1671,
ADELAIDE. S.A. 5001
Council of Australian Weed Science Societies Survey on Society Amalgamations.

Please circle your choices and return to the address given below. Thankyou.

Member's Name ...................
Society ..................................................

1. Should your Society include:
   (a) all plant protection activities? YES NO
   (b) all agronomic activities? YES NO

2. Do you feel that your Society's membership needs to be expanded to remain viable? YES NO

3. Does your Society fulfill your needs? YES NO

4. Do you think that your Society needs to change its activities programme? YES NO

5. Are you aware of the present structure of Weed Science Societies in Australia? YES NO
   If yes, are you satisfied with the affiliation of your Society through CAWSS? YES NO

6. Do you consider Weed Science to be a separate discipline? YES NO

7. Which of the following areas do you think need consideration over the next 5 years?:
   1. Herbicide evaluation more same less
   2. Use of adjuvants more same less
   3. Herbicide application more same less
   4. Ecology/biology more same less
   5. Biological control more same less
   6. Soil/water residues more same less
   7. Reduced tillage more same less
   8. Economic thresholds more same less
   9. Weed economics more same less
   10. Training of applicators more same less
   11. Training of extension staff more same less
   12. Training of research workers more same less
   13. Development of bioherbicides more same less
   14. Study of herbicide resistance more same less
   15. Integrated weed management more same less
   16. Development of strategies to reduce herbicide use. more same less