

Characterising the percentage resistance of spotted and blue alfalfa aphids in lucerne.

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The SARDI lucerne breeding program began screening for blue-green aphid (BGA, *Acyrtosiphon kondoi* Shinji) and spotted alfalfa aphid (SAA, *Therioaphis maeulata* (Buckton)) during the late 1970s following the invasion of these two pest species into Australia. The technique used by SARDI is similar to that described by the NAAIC standard tests (Berberet *et al* 1991), however the aphid infestation is not terminated by spraying prior to rating.

A comparison of the two techniques is presented. When rating using the SARDI technique, the symptoms of susceptibility (ie. vein clearing and chlorosis in SAA and small, distorted trifoliates in BGA) are also assessed in addition to growth stunting and plant death (table 1).

The NAAIC technique produces results of percentage resistance that are higher than that obtained with the SARDI technique, particularly for cultivars with a high proportion of moderately resistant plants. In the NAAIC protocol for SAA, a plant that produces a single trifoliolate within 10-15 days after spraying is given a resistant rating, regardless of whether this trifoliolate shows symptoms of damage. When tagged, some of these plants died when re-introduced to aphid attack. When using the NAAIC technique, the timing of the insecticide application was also critical, too early and the check susceptible cultivars that appear dead are able to recover and produce a trifoliolate (thus giving them a resistant rating).

Although the NAAIC protocol may be designed to represent plants that would survive a transitory field aphid attack, the authors feel that some lines identified with a resistant rating from this test may suffer substantial economic damage under a sustained field aphid attack. The SARDI technique is proposed as an alternative technique to the NAAIC protocol; it is simpler because it avoids the difficulty of timing the insecticide application, and it is more useful for plant breeding applications because only plants with no visible symptoms of aphid attack are given a resistant rating.

Table 1. Comparison of the rating scales used in the SARDI and NAAIC protocols for evaluating resistance of alfalfa to spotted alfalfa and blue green-aphids.

	NAAIC Protocol	SARDI protocol
Spotted alfalfa aphid		
Rating 1	Resistant (rating 1&2): Plant has formed at least one trifoliolate	Resistant: tall healthy plants with no damage
2		Resistant: Some stunting of growth only, trifoliates healthy
3	Susceptible: Plant has developed very little during infestation	Susceptible: Severe stunting with yellowing of trifoliates
4		
5	Susceptible: Plant dead	Susceptible: Plant dead
Blue alfalfa aphid		
Rating 1	Resistant: Tall, normal trifoliates	Resistant: Tall plants with no damage, normal internodes and trifoliates
2	Resistant: Tall, small trifoliates	Resistant: Tall plants with no damage, shorter internodes, smaller trifoliates.
3	Resistant: Mod. tall, small crinkled trifoliates	Susceptible: Moderately tall, small crinkled (distorted) trifoliates
4	Susceptible: Short; small, crinkled trifoliates, usually chlorotic	Susceptible: Small plant, severely stunted
5	Susceptible: Plant dead	Susceptible: Plant dead (rare)

Reference: Berberet RC, Caddel JL, Zarrabi AA (1991) Spotted alfalfa aphid resistance. NAAIC standard test protocol.