

The breeding and selection of an aphid-resistant harbinger-type strand medic by backcrossing

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Annual medics play a pivotal role as pasture legumes in many of the classic ley-farming systems of southern Australia. In these systems, cereal crops are grown in rotation with ley pastures of annual medics which usually regenerate from seed set in previous pasture years.

However, medic density in these pastures has generally declined. One major cause of this decline has been the lack in many areas of well adapted cultivars which are resistant to the highly damaging aphid pests, blue green aphid (*Acyrtosiphon kondoi* (Shinji)) (BGA) and spotted alfalfa aphid (*Therioaphis trifolii* (Monell) fm. *maculata*) (SAA). This paper describes in brief a backcrossing program carried out by the National Annual Medic Breeding Unit which has resulted in several aphid-resistant lines closely matched to the well adapted, but aphid susceptible cultivar, Harbinger. Similar backcross programs based on the cultivars Borung, Cyprus and Jemalong are also underway.

Methods

As no suitable sources of resistance to SAA and BGA were found within the Harbinger (*Medicago littoralis*) species, an interspecific cross between Harbinger and a line of *M. truncatula* with dual aphid resistance (SA 10419) was produced in 1981. This interspecific cross had low fertility and a fairly high frequency of albino individuals in early segregating generations. About 200 F seedlings were successfully raised and screened for resistance to SAA and BGA. More than 100 were found which had resistance to both SAA and BGA, and several of these were then backcrossed (BC*1) to Harbinger. Sixteen hybrid seeds were produced from nine successful crosses. Resultant F¹ plants were isolated and backcrossed again to Harbinger (BC*2). Twelve

F¹ plants were produced of which two were dual aphid resistant and used for the final (BC*3) backcross to Harbinger. Dual aphid-resistant plants from this backcross have been grown on and progeny tests of F single plants has resulted in the isolation of ten lines which are not segregating for resistance, to either SAA or BGA.

Results and discussion

Surviving progeny of the initial cross in this series (SA 10419 x Harbinger) mostly bear a much closer resemblance to their barrel medic parent than to Harbinger. However, in the ensuing backcross sequence, BC*1, BC*2 and BC*3 progeny groups show progressively less variation and correspondingly greater similarity to Harbinger. Both BC*2 and BC*3 selections could readily be mistaken for Harbinger, but distinctive differences remain in some plants. These include particularly a leaf marker and the direction of pod coiling. Of the ten BC*3 progeny groups not segregating for aphid susceptibility, only four were not segregating for one or other of these characters. Two of the four have a large brown blotch leaf marker, while the other two are identical to Harbinger except for their aphid resistance. All have pod coil direction the same as Harbinger. It is planned to release one or more of these selections as an aphid-resistant version of Harbinger. Final selection will depend on field trial results and industry pressure for either a cultivar identical with Harbinger or for one which may be distinguished from it in the field through its leaf marks.