Hessian fly : a potential threat to stubble retention in Australia

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Stubble retention and reduced tillage enhance the survival of the Hessian fly *(Mayetiola* destructor (Say)) in the U.S.A. (1). If the insect becomes established as a pest of the Australian wheat crop then it may retard the adoption of these new tillage practices. In the U.S., Hessian fly was regarded as the number one insect pest of wheat until there was widespread use of resistant varieties. The insect is widely distributed but is favoured by areas with warm, wet autumns and springs (2). In Australia areas south of 35 latitude have environmental conditions similar to those where the fly is most prevalent in the U.S.

Hessian fly from Europe has spread (usually as puparia in straw) to most other wheat growing countries of the world. New Zealand is the area of infestation nearest to Australia (3). The recent entry of the Pea aphid *(Macrosiphum pisi)* into this country is thought to be via New Zealand (P. Cregan, pers. comm.), so it is quite possible that N.Z. could also provide the source of a Hessian fly infestation.

Adult Hessian fly that emerge from stubble in autumn lay their eggs on the leaves of young wheat. Larvae then feed on the plant before overwintering as puparia. In spring, adults emerge from the overwintering phase to lay eggs that give rise to a second brood (4). Infestation can thus occur before or after jointing resulting in yield losses of 20-30% (2).

In the absence of wheat, the Hessian fly is able to feed on many species of the tribe *Hordeae* (5), including grain barley *(Honleum vulgare),* and perhaps in Australia, the introduced weed species, Barley grass *(H. leporinum)* and Mediterranean Barley grass *(H. hystrix). It* is also capable of surviving on some species of *Agropyron, Agrostis, Bromus* and *Lolium* (3).

Overseas, the control of the insect has progressed from cultural to biological and then chemical means. Cultural practices have included stubble disposal (6), crop rotation and sowing after "safe" dates (2). The breeding of resistant varieties has achieved the greatest success (7). The treatment of seed and soil with systemic insecticides is only a recent development (8). Researchers are also looking at the effects of leaf pubescence (9) and increasing plant tiller number (10) on fly feeding habits, as well as the release of dominant avirulent races into the Hessian fly population (11).

The conundrum in the event of an outbreak of the pest in this country may relate to the choice of cultural control methods such as disposing of stubble combined with a "safe" sowing date, in lieu of stubble retention and greater choice of sowing time. Any decision to use an insecticide in response to an outbreak would be delayed until the nominated chemical is registered.

The best control strategy would seem to be one of positive identification of the pest, followed by concurrent moves to register suitable pesticides, canvass expert overseas advice on cultural control methods and begin a breeding programme to introduce resistance into our wheat varieties. By drawing on resistant germplasm presently in the Australian Wheat Collection, it is estimated that it would take 5 to 6 years at the least to release a resistant variety (R. Martin, pers. comm.).

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