Cereal aphids in high-yield cereal crops

M. Grimm

Department of Agriculture, Albany, Western Australia, 6330

Research in medium to high rainfall zones (350-600 mm) of Western Australia has shown cereal aphids (Rhopalosiphum maidis (Fitch) and R. padi (Linnaeus)) caused yield losses of 800-1800 kg/ha in barley where crop yield potential is over 3 tonnes/ha. Preliminary data indicate that significant losses can also occur in wheat. The work is part of a multidisciplinary project on the biological and agronomic factors reducing the rainfed potential yield of cereal crops.

Methods

Six varieties of barley were sown (16 April) in plots into lupin stubble on duplex soil of sand (50-100 cm) over grave1 and clay. Seed was treated with triadimefon to control powdery mildew. A split plot design was used with aphicide treatment as main plots and varieties as sub-plots. Aphids were sampled fortnightly from Zadocks G.S. 12, by scoring 20 tillers per plot. Aphicide was applied if aphids were found on 1 tiller in treated blocks.

Results and discussion

Table 1 shows significant grain losses of 800-1800 kg/ha, attributed to the direct feeding of aphids. There were no visual symptoms of BYDV, but without ELISA screening, the possibility of virus related losses cannot be ruled out. R. maidis first appeared at Z 11, and colonies developed only within the furled tips of tillers. Each colony grew to 20-50 aphids per tiller by Z 40, and declined after flag leaf emergence. R. padi first appeared at Z 21, with colony development on the outside of tillers, from the base of the plant upward. Colonies grew to 50-100 aphids per infested tiller, and persisted well into grain filling (Z 60). Overall, aphids infested 70% of tillers by Z 40.

It is concluded that aphids can cause serious losses in barley where agronomic techniques allow yields to approach those theoretically possible (1); such a finding is in agreement with overseas experience (2). Preliminary data indicates that wheat may be similarly affected.

It is hypothesised that production of high yield crops depends on getting a package of factors right (3), and that the potential loss due to any single factor increases as potential yield is approached. Farmers adopting high-yield technology are finding that 1-2 aphicide sprays are adequate to control cereal aphids.

Table 1. Grain yields (kg/ha) of barley varieties grown with and without control of aphids (R. maidis and R. padi)

Variety	Aphicide	Unsprayed	Difference	% difference	LSD
Skiff	5,600	3,813	1,787	32%	P= 0.01
77S/396	4,827	3,640	1,187	25%	812 kg/ha
77S/401	4,453	3,307	1,440	30%	
Moondyne	4,453	3,627	827	19%	
Stirling	4,133	3,240	893	22%	
Triumph	4,027	2,787	1,240	31%	

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