

AR37 study highlights little-known pasture pest

The novel endophyte AR37 has now passed the close scrutiny of peer-reviewed scientific assessment. In the process, a previously unrecognised ryegrass production-limiting pest may have been uncovered.

AgResearch scientist Dr David Hume presented his investigation for the first time to the New Zealand Grassland Association conference in Taupo early in November. While AR37 has through the period of its identification and testing been subjected to widely reported study, this is the first work to undergo peer review.

AR37 produces a unique range of alkaloids called janthitrems, and none of the alkaloids that other endophytes do. Janthitrems appear to be toxic to a wide range of insects, but AR37 has been claimed specifically to resist attack by African black beetle, Argentine stem weevil, root aphid, pasture mealy bug and porina caterpillar, a wider range of resisted species than any other endophyte offers.

Hume compared Grasslands Samson perennial ryegrass infected with AR37, the AR1 endophyte and standard endophyte over three or four years. The two trial sites were near Kerikeri and at AgResearch's Ruakura research unit.

His work has confirmed the validity of claims made for AR37 in terms of improved productivity. Essentially, the AR37 plots outperformed the others at both sites. At 36%, its superiority over the other two endophytes was greater at Kerikeri than the 17% observed in Hamilton, and this difference increased over successive years at each site.

AR1 and standard endophyte produced broadly the same amount of dry matter in all seasons at both the sites except in the summer of year one when AR1 was 25% ahead of the standard endophyte.

Populations of root aphid and black beetle, the only target insect pests encountered in this trial, were consistent with the conclusion that they influenced the yield and tiller count results.

Scientists like Hume continue to be surprised at how much difference one endophyte can make to ryegrass productivity compared with other endophytes, however it is the insect dimension of this trial that intrigues them more.

Given the location of the trials, black beetle could have been expected to be a factor but it was the emerging significance of root aphid that drew their attention.

Root aphid also was the only insect present in the plots in damaging numbers — at the Kerikeri site — highlighting a previously unrecognised pasture threat, Hume says.

“We didn’t realise root aphid was a significantly damaging pasture pest until AR37 came along.”

In this trial AR37 gave the same level of black beetle protection as standard endophyte, which in both cases was more than AR1, but AR37 still outyielded the standard endophyte by 31% in summer and 66% in autumn. This led Hume and his colleagues to suppose that other factors beside black beetle were at play and this is what drew them to root aphid. Moreover, they had noted that AR37 was outperforming the other endophytes before severe black beetle damage occurred in Hamilton in year four.

Root aphids establish themselves in colonies around plant roots in a water-repellent white wax, assumed to have prophylactic properties, which makes them easier to identify. In this trial, infestations were observed to be most significant in year two at Kerikeri and year four at Hamilton — in both cases AR37 had the lowest and AR1 had the highest.

In discussing his findings, Hume suggested the presence of this insect could explain AR37’s superiority in other previous trials throughout NZ.